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APRIL 1993

IP NETWORKING   95

Providing network access for users in remote or hard to reach locations can often be a difficult and costly exercise. Most requests from these people are for host access, shared file and print services and, increasingly, electronic mail. Graeme Le Roux takes a look at some of these problems and points out that, while there are several ways to provide such services, the most mature solutions revolve around the use of the TCP/IP suite. Along the way he illustrates the possibilities and practicalities of using TCP/IP as an alternative, or an addition, to a 'name brand' network operating system and discusses some of the implications of doing so.

Competing in Court

'Competition should be in the marketplace and not in the courtroom.'

So read the most cutting line from a Telecom statement issued in response to Optus' decision last month to commence legal proceedings over its claim that Telecom's Flexi-Plan and Strategic Partnership Agreements allegedly breach the *Telecommunications Act*. Telecom also maintained that Austel had approved the tariff arrangements and that it 'should be free to offer fair discounts in a competitive market.' Needless to say, Telecom affirmed its intention to defend the action and the 'rights of its customers.'

But Austel decision or not, in Optus' view Telecom is acting in a fashion damaging to telecommunications competition. In the words of Optus CEO, Bob Mansfield, Telecom is 'using its market power in breach of the *Telecommunications Act* to pick off customers and sectors of the market before Optus has had the opportunity to deliver the benefits of competition and lower prices across the board.' The decision to take legal action was taken reluctantly, but 'Optus had no other available alternative in seeking a fair go,' he said in a statement announcing the action. In a later statement released by Optus, the language toughened still further. In words once again attributed to Bob Mansfield, Telecom's reply to Optus was described as 'alarmist' and 'misleading.' It maintained that some Flexi-Plans were in 'flagrant breach' of the Act and that 'no company should be above the law. Optus has sought the Court's assistance in making Telecom comply with the law.'

So who is right? Has Austel failed in its charter to avoid the kind of regulation-by-litigation common in other countries? How well could the Courts determine the matter? Has Optus finally come up against an obstacle that a quick appeal to Canberra can't solve?

On page 15 of this issue Stuart Corner provides a summary of Telecom's flourishing Flexi-Plan and SPA schemes and the relevant legislation. His story highlights the first potentially serious stumbling block the new carrier has encountered in its progress so far; progress that Shelley Spriggs tracks in her lengthy examination of the Optus odyssey starting on page 59. As Shelley found, Optus has so far been remarkably successful in getting its message across, establishing its own infrastructure and offering services. In this it has been assisted by Government goodwill, helpful legislation and a reasonably cooperative attitude by Telecom. It will be interesting to see if the Federal Court is as accommodating as the Federal bureaucracy.

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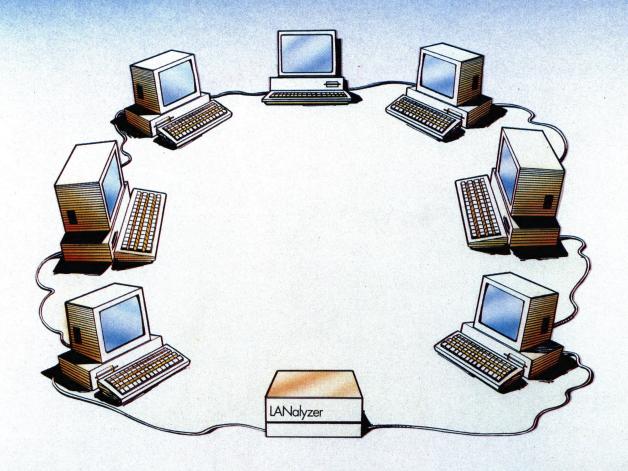
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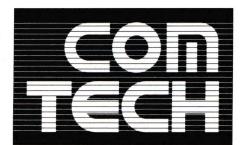
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AOTC Senior Organisation - March 1993

Frank Blount — CEO

Steve Burdon — GMD Corporate, Government & International
- Lindsay Yelland — **Corp & Govt**
- Warren Grace — **Enterprises**
- Peter Shore — **International**

Harvey Parker — GMD Consumer & Commercial
- Ian Campbell — **Commercial**
- David Oertle — **Consumer**

Doug Campbell — GMD Network & Technology
- Brian Lovelock — **ITG**
- Doug Campbell+ — **Network Products**
- Pat Minihan — **Services**
- Ray Liggett — **TRL**

Under Recruitment — CFO*
- Warwick Gilbert — **Audit**
- Shane Allan — **Finance**

+ Acting

* Other Direct Report functions to the CFO will include: FMS Project, Treasury.

- Dennis Flentje — **Breakthrough**
- Chris Vonwiller — **Corp Affairs**
- Alan Brand — **Corporate Support**
- Bill Dawson — **Industrial Relations**
- Charles Zoi — **Marketing**
- Bruce McKay — **Personnel**
- Jim Holmes — **Secretary**
- Graeme Ward — **Strategy/Regulatory**
- Harry Wragge — **Technical**

GMD = Group Managing Director

Blount Shakes Up AOTC Structure

After little more than a year in the top job, AOTC CEO, Frank Blount, has stamped his mark on the carrier by making the first significant changes to the organisational structure developed by the AOTC Interim Board. Effective from March 15, the most important change is the creation of two additional Group Managing Director (GMD) positions alongside Doug Campbell and Steve Burdon.

In a memo to all staff, Blount said the changes 'will streamline decision making and allow a sharper focus on strategy.' They are 'designed to enhance our delivery of customer service. Improved organisational efficiency will mean improved customer service.'

He emphasised that the basic structure of the Business Units and Corporate Centre Directorates has been maintained and that the changes would have 'no direct impact on the vast majority of people in the company.'

The two new GMD positions reporting to the CEO are the Chief Financial Officer (CFO) and GMD, Network and Tech-

nology. Former GMD, Commercial and Consumer, Doug Campbell, has been shifted sideways to the new Network and Technology post, with former Telecom Australia executive and recent New Zealand Post CEO, Harvey Parker, recruited to head Campbell's newly vacated position. Steve Burdon retains his current position as GMD, Corporate, Government and International, and the new CFO position is still to be filled.

Additional personnel changes include the appointment of David Oertle as Managing Director of the Consumer Business Unit (replacing the outgoing Mike Makieve), and Ian Campbell as Managing Director of the Commercial Business Unit.

Other structural changes include the shifting of Regulatory Strategy and Coordination from the AOTC Secretariat to Corporate Strategy; Corporate Advertising from Corporate Affairs to Corporate Marketing; and Management Development and Telecom Training Services from the Services Shared Resource Unit to Personnel.

Exicom Boosts Trading Profit

Bolstered by an improved trading profit performance for the half year to December 31, 1992, Exicom has sealed a PABX sole distributor agreement with Canadian giant Northern Telecom's NorTel Australian subsidiary.

Releasing the results, CEO Bob Cruickshanks said trading profit for the second half of 1992 increased to $2.2 million from $178,000 recorded in the same period in 1991. The improved result was posted despite a $10 million fall in revenues to $65 million, largely caused by the sale of the company's US operation and the continued rationalisation of unprofitable Australian business, he said. Profit before tax was $280,000 following $1.9 million in redundancy payments caused by staff reductions at the company's Villawood (NSW) plant.

The NorTel deal extends an existing two-year Exicom-NorTel PABX service and support agreement to include sales and marketing and covers NorTel's Meridian-1 PABX range.

Our Reasonable Payphone Service

Austel has concluded that the provision of payphone services in Australia is 'reasonably acceptable' but that Telecom must provide more financial information if new applications for payphone tariff rises are to succeed.

While payphone charges did not emerge as an issue in Austel's just-released study of payphones, "Telecom's ability to provide separate financial information on its payphone services needs to be enhanced," according to Chairman, Robin Davey.

The Austel report found that there appear to be adequate numbers of payphones to meet demand, with most people surveyed saying they lived within one kilometre of a payphone. However, Austel has recommended that Telecom treat requests for additional payphones as part of its obligation to provide reasonable access to telephones across Australia. The report also recommends that Telecom should compensate operators of private payphones for providing access to directory assistance and other free services.

Bull Returns to Profitability

Bucking the downward spiral of its Groupe Bull parent, Bull HN Information Systems Australia has managed to turn a $19 million loss posted in 1991 into a $2.5 million profit for the year ended December 31, 1992. The result was achieved on a fall in turnover from $137 million in 1991 to $113 million last year.

John McKim, Bull Chairman and CEO, described the turnaround as "a great result, given the problems the industry has been facing." It signalled the success of the company's policy to abandon hardware sales and concentrate on services, he said. In Australia, Bull focuses on hardware, software and network support services. The company recently recruited Qantek General Manager, Barry Grisdale, as its new Managing Director.

Mixed Results For IDA Participants

Strong growth in both exports and imports, combined with a fall in local content, marked the performance of companies participating in the Industry Development Arrangements (IDA) during the second half of 1992.

Austel's most recent IDA report card shows that exports reached $38.86 million in the period July-December last year, up 233% on the result achieved in the scheme's first six-month period in 1989 and over $13 million up on the $25.14 million reported in the second half of 1991. Imports rose from $85.43 million to $103.20 million while turnover was posted at $189.82 million compared to the $184.63 million posted in 1991 and $262 million in 1989. R&D expenditure rose to $9.63 million compared to $8.48 million posted in the corresponding 1991 period.

Australian production as reported by the participants rose from $131.25 million in 1991 to $147.36 million last year. However, local content as both a proportion of turnover and of Australian production continued its downward slide. Local content accounted for only 30% of Australian production and 23% of turnover for the period, compared to 35% and 25% respectively in July-December 1991.

Jtec-Retix Technology Alliance

Jtec, Australia's world-leading ISDN specialist, last month sealed a deal with leading US OSI and network equipment vendor Retix which will see the companies integrate their respective technologies in future products.

Announcing the agreement, Jtec Executive Chairman, John Riedl, said that the agreement combines Jtec's strength in circuit switching systems with Retix's internetworking expertise. Expected to result in new products by the end of this year, Jtec will incorporate routing technology from Retix's RX 7000 multiprotocol router into its J1000 series ISDN controllers, while Retix will in turn integrate Jtec's ISDN terminal adaptor technology into the RX 7000.

Retix last year reported revenues of over $US70 million and visiting CEO, Steve Frankel, said he felt there was "great synergy between the two companies." He described ISDN as a key technology for Retix.

Jtec devotes around 25% of revenues to R&D and recently reported a 120% rise in revenues to $11.4 million for the year ended June 30, 1992. The company claims the largest installed base of J1000-type ISDN access controllers in the world, and last month opened a new Engineering Centre at its Meadowbank (NSW) head office.

Jtec Executive Chairman, John Riedl (left), with Retix Chairman and Chief Executive Officer Steve Frankel

In Brief

Optus announced on March 12 that it had satisfied its licence condition to supply long distance phone services to more than 45% of the population by the end of March. In a report submitted to Austel, Optus says that long distance services are now available in Sydney, Melbourne and Canberra as well as major regional centres like Newcastle, Geelong and Wollongong.

Stanilite Pacific, maker of trunked and mobile telecommunications systems, has announced a half-yearly after-tax profit of $3.16 million for the period ending December 31, 1992. The result is an increase of 132% over the corresponding period last year. The Australian-owned company says the figures reflect its success marketing its products in Asia.

AWA has posted a $4.93 million loss for the half-year to December 31, 1992. The company said the main reason for the loss was subsidiary AWA Defence Industries, which posted a loss of $4.2 million and a drop in sales revenue of around 28%.

INC has entered into a distribution partnership with networking distribution firm Anixter. Under the new agreement, Anixter will distribute INC's full range of connectivity products for IBM AS/400 and S/3X, Token Ring and Ethernet in Australia.

AAP Telecommunications (AAPT) has opened a new office in Surfers Paradise to help cope with the rapid increase in telephone traffic on Queensland's fast-growing Gold Coast.

Ungermann-Bass has been chosen by Victoria's Department of Planning and Development (DPD) to supply ACC Bridge/Routers to link its 75 field offices, allowing DPD users throughout Victoria to access identical information services and send electronic mail.

Austel has announced that data terminal equipment will be exempt from requiring an Austel permit. The decision covers equipment intended for connection to an Austel-permitted modem or a Network Terminating Unit warranted to provide a SELV interface. Safety requirement standard TS001 still applies.

Datacraft is to be employed by the Australian Army to build a large-scale mail-enabled application to transfer information on personnel within a nationwide OSI WAN. The Army's mainframe-based central office in Canberra will be connected with 350 remote sites via leased lines and dial-up modems.

Optus has signed a new five year agreement with the ABC to provide satellite broadcasting of ABC radio and television to transmitter sites throughout Australia and to remote homesteads.

Pacific Star, the Bell Atlantic-Telecom New Zealand consortium which last year won the right to manage the Queensland Government network is bidding for a $US30 million network management contract to service one third of Indonesia's telephone lines. The company is part of a consortium including Bell Atlantic, Telecom New Zealand, and Indonesian firm Metrodata.

The Royal Flying Doctor Service has signed a $250,000 contract with Adelaide firm Teknis Electronics to install a 24-hour emergency call network for remote radio base station operations.

NorTel is expanding is Wollongong-based NorTel Technology Centre to establish a research and development program focusing on Intelligent Networks. The Centre will design and develop software to provide programmable network elements.

Pay TV via satellite could be available in Australia as early as April 1994, due to recent technical innovations in the compression of digital video. Optus, which is providing the satellite delivery for the Australian Pay TV system, says it will be looking at demonstrations of new systems over the next few months.

GEC Alsthom has formed a new division, to be called GEC Alsthom Information Technology. The division will concentrate on network integration, computer systems, software and outsourcing. Rob Hack has been named General Manager.

Fujitsu Australia will enhance its FALNET international value added network service by providing data communications services from Australia to Japan and Taiwan, allowing users to connect on a dial-up or dedicated connection basis. There are FALNET nodes in each Australian capital (excluding Darwin and Hobart) as well as in Auckland and Wellington in New Zealand.

In Brief

Inmarsat has awarded contracts to several aerospace companies and consortia to help determine the approach for its proposed Inmarsat-P global communications system. The winners include General Electric Astro with Matra-Marconi; Hughes Space & Communications with British Aerospace and NEC; TRW; and India's Antix. The companies will examine low-earth orbit, geostationary and intermediate circular orbit approaches.

Novell has reported net revenues of $US260 million for the quarter ended January 30, 1993 — a rise of 27% on last year. Total sales of network operating system products rose by 32%.

Alcatel and Sprint have announced plans to form a joint venture company to be called Alcatel Data Networks. The new company, based in Paris, is planning the introduction of a next-generation data switching product line called the HSS (High Speed System), which will be based on ATM technology.

GSM exports could face more restrictions according to the Chairman of the GSM MoU Committee, Kari Marttinen. He told the recent 1993 Pan European Digital Cellular Conference in Lisbon that CCITT Signalling System Number 7, interexchange hand-off and IN database management are also being looked at by 'export controllers,' and could be delayed.

Alcatel and DGPT, the Vietnamese post and telecommunications authority, have announced a joint venture called Alcatel Network Systems Vietnam, to be based in Hanoi. The new company will make, engineer, and sell Alcatel's 1000 E10 public switch, and aims to produce 150,000 lines of switching a year.

Unisource Business Networks is to take over the running of the Europanet academic and research network for the next three years. Access to the network has also been extended to include Poland, Hungary, and the Czech and Slovak republics.

France Telecom has announced that its turnover rose in 1992 to FFR121.5 billion before tax. Net profit for the group was FFR3 billion, compared with FFR2.05 billion last year. The number of installed lines increased by 1 million to over 30 million, with over 83% of switching and 87% of transmission digital.

Deutsche Bundespost Telekom, with revenues of $US31.7 billion, was by far the largest European operator by turnover in the financial year 1990-91, and has been ranked Europe's 18th largest company in the *Financial Times'* all-industry top 200. Also included in the top 50 list were France Telecom (29) and BT (32).

IGI Consulting says it expects investment in submarine fibre optic cables to grow by 15-20% per year, to reach $US18 billion by 1998. Over $US15 billion of that $US18 billion has been committed already, according to IGIC.

Germany's Intelligent Network will be able to assess the type of traffic on the public telephone network by 1996, says Dieter Gallist of Deutsche Bundespost Telekom. He said Telekom could use the ability to differentiate between voice, data, images and text to charge different tariffs for different types of information.

The World Telecoms Standardisation Conference convened by the ITU in Finland last month examined proposals for the establishment of a Telecoms Standardisation Advisory Group, and reviewed the approval process for standards. Tabled for consideration and approval were 474 proposed standards.

Don Cruickshank has been appointed UK Director General of Telecoms. Mr Cruickshank, who was formerly the Chief Executive of the National Health Service in Scotland, replaces Sir Bryan Carsberg, who is now the UK's Director General of Fair Trading.

Inmarsat's Aero-C satellite communications system for general aviation became operational recently with the commissioning of terminals aboard a Beechcraft King Air C90A owned by Denmark's Thrane & Thrane and three Canadair Challenger jets.

AT&T and Taiwan's Ministry of Economic Affairs are planning joint ventures for technology transfers and build/operate/transfer projects. Meanwhile, AT&T Network Systems and AT&T Thailand have announced that they have won a $US273 million contract to modernise the Thai telecoms network with transmission and switching, outside plant and services for 350,000 lines.

Radio Local Loops Get UK Approval

Radio-based local loop services will become a reality in the UK following the granting of a licence to Ionica L3 to run a new national radio-based telephone service and the beginning of a public consultation process for five other licence applicants.

Cambridge-based Ionica's victory was announced by United Kingdom Board of Trade President, Michael Heseltine, and came after a public consultation period of several months. The five new applicants which will now go through the same consultation process are: Scottish Power, City of London Telecommunications, Telecom Electric, Scottish Hydro Electric, and Millicom Holdings.

If successful in its licence bid, Millicom Holdings is expecting to gain approval for a broadband local loop and the right to carry entertainment services. Managing Director, Matthew Hare, said video-on-demand might be a likely service, but stressed that his company did not want to become a broadcaster and had no plans to create the film programming databases necessary.

Russians Win Iridium Contract

Motorola has signed a contract with Khrunichev Enterprise in which the Russian firm will provide launch services for a portion of the Iridium constellation of low-earth orbit satellites.

Builders of the Proton rocket and *Mir* space station, Khrunichev Enterprise will launch 21 satellites on three Protons, each carrying 7 satellites. The company will also invest $US40 million in the Iridium project.

Iridium will eventually comprise 66 active satellites and 7 spares, and will provide a global personal communications network. The majority of the Iridium satellites are expected to be launched by US aviation giant McDonnell Douglas.

Motorola maintains that current planning calls for the launch of commercial services in 1998.

US Carriers to Join ATM Trials

US carriers AT&T and MCI are currently in negotiation with a group of European operators to join an international asynchronous transfer mode (ATM) pilot trial. The European group is also holding discussions with Japanese telecommunications firms NTT and KDD, and national operators in Scandinavia have also agreed to join. Trials could take place by early next year.

The original international pilot ATM trial was announced in 1992 by Europe's five largest telecoms operators — Deutsche Telekom, France Telecom, BT, Stet/ASST and Telefonica.
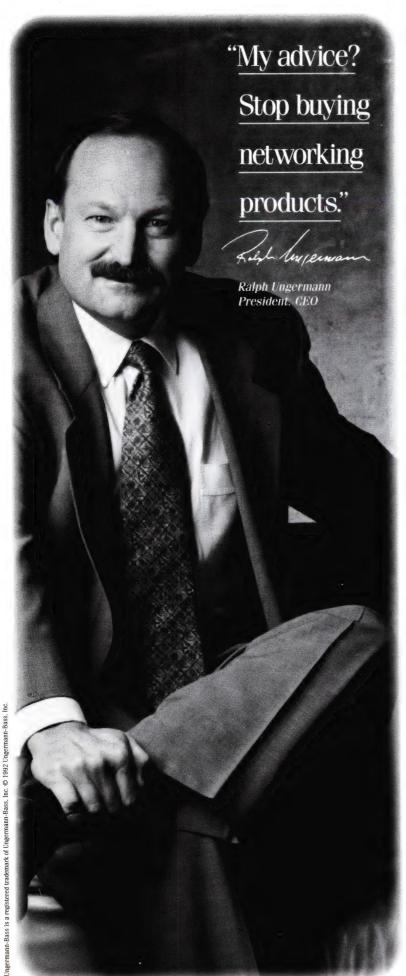
The plan involves building a virtual path ATM cross connect between each participating carrier's network, initially to begin evaluating 34Mbps wide area internetworking performance.

Alcatel Wins $US400m China Deals

Two Alcatel companies, Alcatel Standard Electrica of Madrid and Alcatel Telecom Norway of Oslo, have recently sealed deals with government agencies in the People's Republic of China valued at around $US400 million.

The deals centre around both companies supplying more than 2 million lines of Alcatel 1000 S12 digital switching capacity over the next few years.
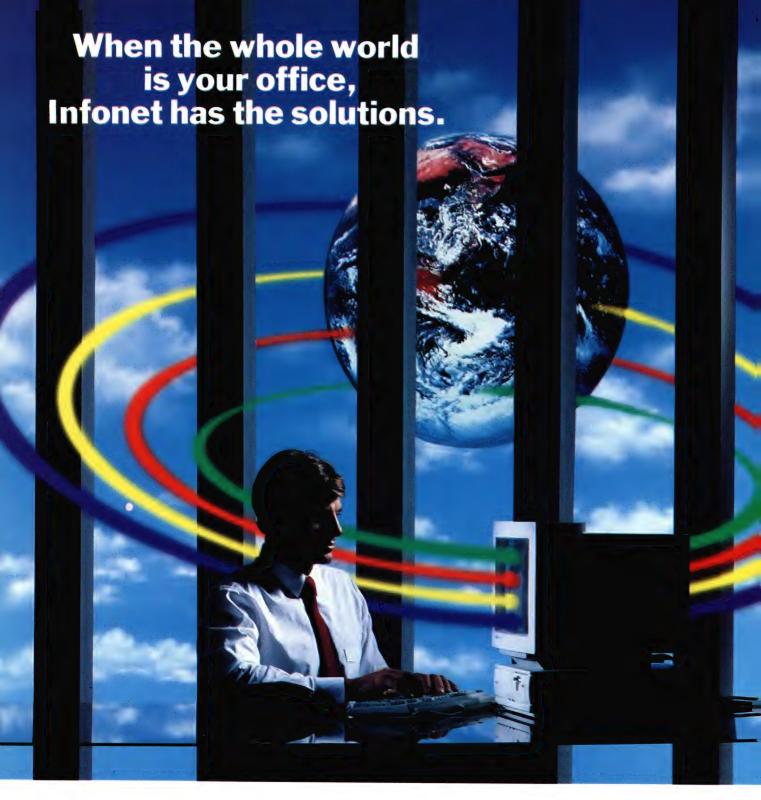
Alcatel Standard Electrica will set up two joint ventures under the agreements. One will be in Sichuan province and will make transmission equipment; the other will be based in Hubei province and will produce power equipment for telephone exchanges. Alcatel Telecom Norway will also supply and install digital switching equipment in Shengzhou Province.

Letting the Courts Decide

Alleging breaches of the *Telecommunications Act*, Optus
has commenced legal action against Telecom.

It was probably inevitable. Despite the attention devoted to tilting the playing field Optus' way and giving Austel adequate resources and a set of teeth to match, Telecom and Optus have resorted to legal action to resolve their disputes. The reason: Telecom's Flexi-Plans and Strategic Partnership Agreements, which Optus alleges are in breach of the *Telecommunications Act*.

Telecom first introduced the term Flexi-Plan to its customers in July 1991, but the original Flexi-Plans applied only to Mobile-Net, and the name is the only thing they have in common with the fixed network Flexi-Plans which have provoked the ire of Optus.

The MobileNet Flexi-Plans replaced the fixed monthly access fee of $40 and fixed call charges with a whole range of monthly access fees from $10 to $130, and a range of call charges from zero to twice the standard rate. Optus has no objection to these tariff schemes, and offers very similar ones itself.

Fixed network Flexi-Plans came on the scene at the end of 1991, and were approved by Austel in December. The first fixed network Flexi-Plan was introduced not by Telecom, but by the newly merged OTC. It was restricted to a very narrow segment of the market: IDD calls to New Zealand. To join the 0011 New Zealand Flexi-Plan, customers paid $2.00 per month and were then able to call New Zealand for 80 cents per minute from 8.00pm to 8.00am every night and all day at weekends. The standard rate at the time was $1.39 during the day (except Saturdays) and 89 cents at night).

Why only New Zealand? Well, of course this was the only market in which there was any competition. The Aussat 0099 service was doing very nicely picking up an estimated 20% of outgoing calls from Sydney, the only city from which it was available.

The Flexi-Plan scheme was soon broadened with the announcement at the end of January 1992 of the STD Everyday Saver Flexi-Plan which, for $5.00 per month, gave customers access to the lowest off-peak rate over extended hours. 0011 Flexi-Plans were also introduced for the US, UK and Canada at $2.00 per month for each.

Promotion of the scheme at this stage was very low key. Selected customers with high STD or IDD usage to the destinations in question were invited to apply, but there was no general advertising. Full scale promotion with a nationwide TV advertising campaign commenced in June. This was shortly after Optus launched its own mobile phone service with claims that Telecom's MobileNet Flexi-Plans were too complicated. Telecom must have agreed; a month after the launch of Optus Mobile on June 15, Telecom simplified MobileNet Flexi-Plans.

A Flexi-Boom

The next Flexi-Plan was the big one — Total Call Saver, announced at the end of August. The plan was the first to apply to local, STD and IDD calls. It was aimed primarily at small businesses, but was also attractive to high usage domestic customers.

For a fee of $5.00 per month customers could get a 5% discount on all normal local, STD and IDD calls. For $15 per month they could get a discount of 6%. The scheme placed an expenditure ceiling on these calls of $6,000 per month. The scheme soon had Optus up in arms. It claimed that a scheme which bundled discounts on STD, IDD and local calls was illegal because Telecom had a de facto monopoly on local calls, and asked Austel to review the scheme.

The launch of Optus Long Distance on November 15 saw the eruption of a full scale media battle for the hearts, minds and dollars of telephone users. Telecom got into serious trouble with the Trade Practices Commission for quoting call charges under Flexi-Plans without factoring in the subscription fee. Even Optus failed to understand the Flexi-Plan scheme fully. It made a factual error about them in one of its press releases.

By this time, Telecom had no fewer than eight Flexi-Plans for the fixed network: Total Call Saver, Everyday Saver, Value Saver, Business Saver, Family and Friends, Business Circle, Corporate Flexi-Plan 1 and Corporate Flexi-Plan 2. In addition, OTC offered country-specific Flexi-Plans to 14 countries, and a World-Bonus Flexi-Plan.

Somewhere along the line the Weekend Plus and Weekday Special Flexi-Plans came and went.

If Optus has its way a few more will disappear from the tariff book. Austel has been examining the question of whether certain Flexi-Plans breach the *Telecommunications Act* since late last year, and in February, according to Optus, Austel acknowledged that both the Total Call Saver and Corporate Flexi-Plans (those applying to local and STD/IDD) were unacceptable.

NSW Deal the Biggest SPA of All

Just two weeks before Optus initiated legal action, Telecom clinched the biggest Strategic Partnership Agreement (SPA) of all. Telecom announced on February 15 that it had been chosen by the NSW Government to supply basic carriage services for its private network — Australia's largest. Under the SPA deal, worth $0.5 billion over five years, Telecom will supply its CustomNet Horizon, ISDN and leased lines to the NSW Government via its network manager, BT Australasia.

Despite the name, the SPA is in fact a generic BCS tariff filed with Austel. A SPA tariff sets out a framework in which Telecom can negotiate with major customers without having to seek Austel approval for every item. In return for a customer's business, Telecom must provide cost reductions. In the case of a very large customer, such as the NSW Government, these will be as high as 10 to 12%, or $60 million over the five years.

Optus alleges that Telecom's SPAs and some of the Flexi-Plan options breach sections 183 and 184 of the *Telecommunications Act*. Optus did not bid against Telecom for this BCS contract, although it is applying to provide mobile services.

Optus claims Telecom is discriminating between customers by providing services at different charges and under different conditions. Yet as Gary Donald, the head of the NSW Government's Telecommunications Unit, puts it: "Let's face it,

Telecom does provide services everywhere in the State of New South Wales."

The SPA does not bind the Government to Telecom, however. Donald said that Telecom "was not in a position to ask for exclusivity." He said there was no reason why either Optus or Arena could not supply basic carriage services.

David Nash, Telecom's NSW Government account manager, said the SPA formalised arrangements between the carrier and the customer. "It's a mechanism for cost reduction, where we give back a discount. The Government gives its forecast of likely need across NSW, which feeds into Telecom's planning," he said. "They are a major customer, we're a major supplier. If we know they need several thousand lines at a certain place, that helps our network rollout plans." He said Telecom benefited through BT's centralised billing, which saved the carrier from collecting and processing thousands of bills.

Planning through a joint executive panel meant that, if the Government required a link to a new regional centre, "that could be the stimulus for Telecom to make it available. We're going to be a large user of CustomNet Horizon around the State, based on [Telecom's] NorTel switches. You might find NorTel switches going in early when they know we are coming," he said. The first traffic on CustomNet could be as early as this month.
Robert Clark

On March 3 Optus announced that it had made an application to the Federal Court to have certain Flexi-Plan and SPA tariffs made illegal. Since that announcement, Telecom has been screaming that Optus is trying to deprive millions of customers of lower costs for their telephone usage. One press release, while it may have fooled the masses, was an insult to the intelligence of informed observers: 'Telecom rejected any suggestion that it was acting in an anti-competitive way by offering local calls as part of one Flexi-Plan. The facts are that Telecom has put in place technical switching arrangements which allow Optus to compete on local, long distance and mobile services. Optus has made a decision not to compete on local calls and simply stick to the more profitable long distance and mobile segments of the market.'

As anyone knows, the costs of duplicating the customer access network with presently available technologies represents a nigh-on insurmountable barrier to entry.

Lawyers Can't Lose

But while much of the attention is focused on the Flexi-Plan discounts it is quite likely that Optus' main concern is the grand-daddy of all discount schemes, a super Flexi-Plan for the very largest customers: The Strategic Partnership Agreement (SPA) which was also the focus of Optus court action.

It must have been very galling for Optus to see itself virtually locked out of NSW Government business for five years when the NSW Government announced that it had signed an SPA with Telecom to gain a substantial discount on its $500 million estimated expenditure over the five year period.

Rural and Remote Communications

Austel Sights Some USOs

One of the questions Austel had to address in its recently released study into rural and remote communications in Australia was to 'take particular account of the extent to which needs (for the standard telephone service) could be met within AOTC's universal service obligation [USO] through better utilisation of existing satellite capacity.'

This question is as old as the satellite system. In the early days of Aussat the satellite was frequently touted as the best method of delivering services to remote areas. Telecom's opposition to the idea was attributed more to vested interest and a commitment to its home grown Digital Radio Concentrator System (DRCS) than to the technical or economic superiority of terrestrial alternatives.

But anyone hoping for a definitive answer from Austel's independent assessment would have been disappointed.

Austel commissioned a consultancy, Sydney-based Teleresources Pty Ltd, to study the potential for satellite services in rural and remote Australia. Teleresources conducted a detailed study of the costs of DRCS, the newer HCRCS (High Capacity Radio Concentrator System), AAP's Skyswitch demand assigned multiple access technology, Intelsat and Optus' MobileSat.

From its study, Teleresources concluded that AAP's Skyswitch service was the most economical but, surprise surprise, Telecom challenged the assumptions which underpin this conclusion. Austel accepted the Teleresources model required further testing and fine tuning, and decided to sit on the fence: 'There would appear to be no simple answer to the question of which technology is the most appropriate for the delivery of services to rural and remote areas.'

However, the industry regulator did manage to reveal that Telecom's DRCS solution proved much more costly than was originally envisaged: 'Traffic levels on DRCS are more than double those theoretically predicted by Telecom in its initial dimensioning of DRCS services.'

As a consequence, Telecom had to reduce the number of subscribers served by each DRCS system, or overlay DRCS installations with the HCRCS system.

The question is far from academic. Telecom is the Universal Service Carrier (USC) and as such is required to provide the standard telephone service throughout Australia using the most cost effective technology. Austel is responsible for ensuring that Telecom fulfills its USC obligations.

However Austel appears to have abrogated the technology decision to Telecom. 'Austel considers that decisions on the most cost effective and appropriate technology (for each particular location) should be left to the carrier(s) and/or service provider(s) responsible for service delivery.'

The satellite vs DRCS question came before the courts a couple of years ago when the Northern Territory Government attempted to force Telecom to speed up delivery of services to remote Aboriginal communities by using Iterra satellite dishes. The NT Government lost the battle, but the Austel report does show the need for additional services in these communities.

Optus has tried to have the SPAs declared illegal. After it appealed to Austel last year, the original tariff was withdrawn only a month after being filed. Telecom modified the scheme and had it accepted in November.

To quote from the tariff: 'a Strategic Partnership is a pricing and management option for customers with large, diverse and complex telecommunications requirements with whom Telecom can achieve a close working relationship in the supply of basic carriage services thereby allowing Telecom to realise cost savings which provide the basis for a discount on the tariff charges paid.'

This wording is designed to ensure that, on the surface at least, the SPA complies with the *Telecommunications Act* which requires a dominant carrier not to discriminate between different customers in the charges and terms and conditions under which a service is supplied except where the discrimination makes 'only reasonable allowance for differences in costs or likely costs of supplying services if the differences result in the different quantities in which services are supplied, the different transmission capacity needed to supply the services, the different places to and from or to which services are supplied, the different periods for which the services are supplied.'

The $64,000 question is can this clause be used to justify the Flexi-Plan tariffs applied to local calls and the discounts offered under SPA? The answer is worth many times this figure, and the way things are shaping up the lawyers will earn many multiples of $64,000 arguing the case for and against.

Stuart Corner is the Editor of Exchange.

Overall rural telephone penetration lags only slightly behind that in the cities. The nationwide average is 95% of households, while in rural areas 93% have a telephone. However, it is much lower in Aboriginal communities. The Bliss report on Aboriginal and Islander Telecommunications commissioned by Telecom in 1991 estimated that less than 10% of Aboriginal households had a telephone, and that in remote communities there was less than one phone per 100 people, a market penetration which many Third World countries can better.

Telecom had, according to the Bliss report, significantly underestimated demand for services under its rural and remote area program, putting the requirement at 2,400 additional services by 1997. The Bliss report estimated 3,400.

Austel has recommended that it facilitate a joint program involving both the carriers and Aboriginal and Islander organisations to identify the need for additional communications to Aboriginal communities and speed up their delivery.

Stuart Corner is the Editor of Exchange.

TCNZ Announces Massive Job Cuts

In February, Telecom Corporation of New Zealand announced its long-expected restructuring together with plans to slash its operating costs. Central to the corporation's plan is a workforce reduction of 40% over the next four years.

This means around 5,200 people will lose their jobs. By 1997, TCNZ's workforce will be reduced from today's figure of around 12,500 to a little over 7,000. The reduction could have a flow-on effect in those industries supporting TCNZ employees, with yet more jobs lost. On current projections, New Zealand's telecommunications industry will employ just 24,000 people by 1997, compared with just under 30,000 today. To put these figures into perspective, in 1987 the then state-owned Telecom employed around 25,000 people.

Staff reductions have already begun. Some 800 jobs went in March, another 2,400 will go by March 1994, and 1,500 more by March 1995. The remaining 500 will leave by March 1997. The layoffs will be implemented right across the corporation, and will hit managers and technical grades as well as other workers.

A TCNZ spokesman admitted there will be 'real pain.' Consequently the corporation will be providing support services for redundant workers. It says some redundant workers may be invited to reapply for their jobs or for new positions. However, unlike earlier periods of restructuring, there will be few opportunities for departing employees to move to similar outsourced positions.

TCNZ said it is expecting to take a one-off write-off cost of $NZ350 million in the fourth quarter to account for the layoffs.

On the same day as announcing planned staff cuts, TCNZ issued third quarter results showing substantially improved earnings on flat revenues. The political significance of the double announcement was not lost on New Zealand's news media. Here, for the first time, the public faced the stark reality of a privatised, competitive telecommunications industry. And one thing quickly became abundantly clear — New Zealanders were not happy.

Spotty Damage Control

Before the announcement, most non-specialist media coverage of telecom issues had focused on trivia or on how the now private TCNZ is now more responsive to its customers than the bad old state-owned monopoly. Despite the occasional over-zealous credit controller and the odd ham-fisted manager, TCNZ had done much in recent years to improve its public image.

In particular, by sensitive sponsorship of community projects and with the aid of cute advertising campaigns featuring cuddly animals, TCNZ was on the way to convincing the public it was not a predatory overseas multinational out to milk New Zealand consumers. To this end, TCNZ is New Zealand's largest television and newspaper advertiser. The central character in TCNZ's current campaign is an intelligent, cute-looking dog called Spot (for Services and Products Of Telecom).

Underlining this, a large colour advertisment featuring Spot appeared in New Zealand's major metropolitan newspapers the day of the layoff announcement. Instead of selling a service — Spot's usual job — the advertisement trumpeted Telecom's Education Foundation, which finances technical equipment for schools. On the same day, the biggest-yet TV advertising campaign began.
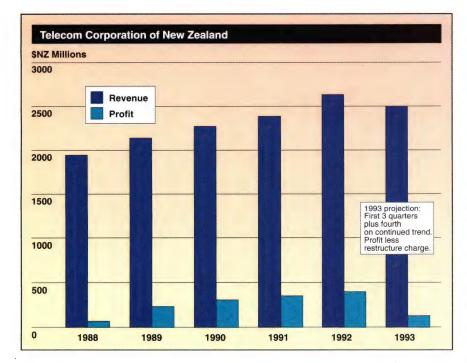
Clever marketing notwithstanding, suddenly all the old fears reappeared. For several days the layoff story was front page news. It dominated radio and TV bulletins, not to mention talkback shows and newspaper 'Letters' pages. The story even pushed aside rebellious National Party politician Winston Peters' fight for survival.

Newspaper cartoonists had a field day. Many made fun of TCNZ's Spot advertising campaign. However, thoughts of TCNZ employees soon eclipsed the satire of the professional cartoonists. One amateur cartoon which was being faxed from office to office around TCNZ showed employees crammed inside a tin of dog tucker — with Spot being reinterpreted as Surplus People Of Telecom. Another cartoon showed a two storey outdoor dunny. The upper cubical was labelled 'Management' and the cubicle underneath 'Employees.'

After getting used to the service and price advantages of telecommunications privatisation, the New Zealand public was suddenly confronted with the brutal social and human cost. TCNZ has never been popular, but overnight the corporation's public image sank to new, yet-uncharted depths, despite a carefully controlled public relations campaign — perhaps the most skillful of its type ever mounted in New Zealand.

Just how this affects the Corporation in the long term remains to be seen. It is worth noting that TCNZ's main rival, Clear Communications, reported a surge of customers signing up for its alternative service in the wake of the announcement. According to a newspaper report, Clear's phone lines were jammed with new customers when news of Telecom's staff cuts became public.

And Clear was not the only beneficiary. TCNZ's share price surged to a record high after the announcement, though it later fell back as investors realised that the projected productivity gains and cost benefits would take time. Indeed, there are even fears that TCNZ may be cutting so deep that it has

Telecom Corporation of New Zealand

$NZ Millions

Legend: Revenue, Profit

1993 projection:
First 3 quarters
plus fourth
on continued trend.
Profit less
restructure charge.

Years: 1988, 1989, 1990, 1991, 1992, 1993

harmed its growth potential. And some investors may be factoring in the damage done to TCNZ's goodwill. Even so, by the middle of March TCNZ shares were still trading at the high end of their range. Market capitalisation effectively valued the corporation at $NZ6.25 billion. This compares favourably with the 1990 sale price of $NZ4.25 billion leaving most investors reasonably content.

Buried beneath the restructuring news were some good financial results. Earnings for the quarter ending 31 December 1992 climbed to $NZ121 million, a rise of 9.7% over the same quarter the previous year. The earnings growth would have been higher still but for changes to the publication date of the Auckland Yellow Pages, which had the affect of moving after-tax earnings of $NZ16.5 million into a later quarter.

Strong Earnings Performance

In the December 1991 quarter, TCNZ earned $NZ110 million, a result which was ahead of analyst expectations. TCNZ is largely owned by US interests and lists on the New York Stock Exchange. This means that United States Security Exchange Commission rules prevent TCNZ from making exact financial projections, however, the figures supplied by TCNZ point to greatly improved operational earnings in the financial year 1993. Earnings will probably be up 10% on 1992.

Thanks to the effect of price competition in the toll market due to rival Clear Communications, December 1992 operating revenue decreased a little to $NZ624.9 million. Therefore, much of the quarter's earnings improvements are due to TCNZ's continuing attention to cost control. When compared with the same quarter a year before, TCNZ managed to trim operating costs by an impressive 7.8%.

These cost cutting measures are likely to take on more significance in the future, as TCNZ has only limited scope for expanding its revenue base. Unless TCNZ can bring new services to the market, New Zealand's spending on telecommunications in general is unlikely to rise much faster than overall economic growth. Improving productivity and finding attractive and profitable new services to market are its only options, hence the need for massive staffing cuts. Toll-call competition from Clear Communications is already denting operating revenue. Though Clear only operates from the 15 largest population centres, it has an estimated 16% market share of all New Zealand's domestic toll business.

Making Clear Gains

It is difficult to make an accurate assessment of how much toll business Clear takes away from TCNZ. The task is made harder because neither Clear nor TCNZ release any figures. What's more, some of Clear's market share comes from the growth in the number of toll calls due to cost reduction — in other words, calls that would not have been made if TCNZ retained a monopoly. However, $NZ300 million is a figure often quoted by both companies.

Clear's toll market share continues to rise and may get a further boost if the company can begin operations in smaller centres. Recently Clear entered the international toll market and is probably winning a similar market share. Clear's General Manager of External Relations, Neil Tuckwell, says on some international toll routes Clear enjoys more than a 20% share.

Eventually the endless legal battles between Clear Communications and Telecom will be resolved, allowing Clear access to

compete in the local call market as well as the 0800 toll-free market. In either case, both markets are only TCNZ's to lose. Even on a modest scale, Clear's entry into either market will improve its domestic toll business, thanks to a knock-on effect.

Recently there has been speculation that other toll competitors are preparing to enter the market. That's unlikely in a market that's as small as New Zealand. More probably, other service providers will find ways of entering some of the specialist niches on the fringe of TCNZ's core business.

More Competition to Come

However, greater competitive pressure will come later this year when BellSouth challenges TCNZ's lucrative cellular monopoly. That could hurt Telecom badly. Telecom Cellular is already one of TCNZ's most profitable subsidiaries and is growing at an annual rate of over 20%.

BellSouth will be offering a GSM digital cellular service — initially mainly in the large population centres. This is unlikely to dent Telecom Cellular's existing business or greatly depress revenues, though it may skim off some the the fatter profits as the top end of the market expands. TCNZ reacted quickly to head off the BellSouth threat. At Christmas, Telecom Cellular launched its own digital cellular service which will sell for the same prices as analogue cellular.

Some analysts say that with 3% of New Zealanders already signed up for Telecom Cellular, the market is reaching saturation. That's unlikely, as overseas cellular operators in more mature markets have yet to test the limits of market saturation.

According to Torbjorn Smith of Ericsson Cellular New Zealand, Sweden found 3% market penetration to be a lift-off point for further sales. Today more than 8% of Swedes have cellular phones. He said that at the 3% point, workers in certain industries such as taxi driving found their cellular-equipped rivals winning a greater share of business. Thus, to stay solvent, all Swedish taxi drivers need cellular. Similar circumstances saw several other industries adopt cellular technology with equal gusto. If this sounds far fetched, remember that Sweden's deregulating economy and sparsely populated geography have many parallels with New Zealand.

In theory, cellular's market penetration could keep on expanding until every New Zealander owns a cellphone. This is to some extent why Telecom Cellular is the jewel in the TCNZ crown. Cellular also points the way to the future. On a return on investment basis, TCNZ's more recently installed cellular network is likely to remain a top performer despite increased competition.

For earnings to stay buoyant with flat or declining revenues from its existing business, TCNZ needs to find further economies or diversify into new markets. In fact TCNZ is doing both. The workforce reduction is

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Anything else? How about Ericsson's small digital handset? But perhaps you should find out more for yourself. Come and see us at ATUG '93.

As you might expect, we'd love to talk.

ERICSSON

only part of the story. Over the longer term the restructure should substantially improve Telecom's earnings. TCNZ Chairman, Peter Shirtcliff, said the benefits of restructure will be realised in 1994-95 and subsequent years.

TCNZ's strategy to find new business is evolving in ways that many observers did not expect when the corporation was sold. At the time, commentators predicted that TCNZ would lose interest in supporting domestic and small customers. Instead, they predicted TCNZ would focus on finding flashy and expensive high technology services to sell to large business customers at a premium.

This fear led to the government of the day imposing a Kiwi Share Obligation on TCNZ which in effect acts as a barrier to raising residential telephone rental fees or imposing charges for residential local calling. Until now, TCNZ has viewed this commitment to residential phone users as a brake on its profit potential, but increasingly the corporation is waking up to the opportunities presented by its domestic customers. Long term they may prove to be far more lucrative than originally thought — especially as technology evolves and TCNZ gets first bite at selling on-line information and entertainment services into homes.

Such a process has already started in a modest way. While TCNZ has invested considerable effort in selling upmarket services to key business customers, it has found that selling sophisticated telephone services to small businesses and residential customers can be equally lucrative. TCNZ's Spot products are largely small extra services, such as call-waiting or forwarding, that consumers and small business customers find useful. The majority of Spot services sell on a subscription basis with charges being added to customers' monthly bills. In most cases, the charge for a Spot service is fairly small — often less than $5. This means customers feel they can afford to buy one or more services without any financial pain. However, TCNZ's costs in providing a Spot service can usually be measured in cents, and once a customer signs up for a service, they pay for it month after month.

Bill Bennet

Melbourne May Lose ATUG'94

Better known for exposing anomalies and inequities in the provision of telecommunications services, the Australian Telecommunications Users Group (ATUG) has almost unwittingly embarrassed Melbourne authorities by exposing the city's inability to accommodate an event as big as the annual ATUG exhibition and conference.

In the spotlight is Melbourne's World Congress Centre, where the ATUG event was staged last year, and which proved woefully small. The net result is that unless Melbourne can come up with a more suitable space, the 1994 conference and exhibition may not automatically rotate back to Melbourne, and could again be staged at Sydney's Darling Harbour, where this year's show will be held in May.

Riddell Exhibition Promotions, ATUG's exhibition organisers, say that Darling Harbour offers 10,000 square metres of space for the exhibition, with adequate space for the conference. But Melbourne's World Congress Centre could provide a maximum of only 7,300 square metres, and that much space could only be achieved by taking some space away from the conference program,

According to Riddell exhibition organiser, Tony Pool, things were so tight last year that the areas allotted to large exhibitors such as AOTC and Optus had to be restricted and the doors closed to some prospective entrants. *Australian Communications* understands that if next year's ATUG show were to be staged at the World Congress Centre without any additional space being provided on site, some major exhibitors may pull out.

Given that the ATUG'93 will feature between 140-150 exhibitors, compared to last year's 125, Melbourne's hopes of luring the show back next year now rest on planned improvements to the government-owned Royal Exhibition Buildings, which can provide a total of about 22,000m^2, but which lack quality conference facilities.

Stressing that ATUG was committed to Melbourne as a show venue in the long term, Executive Director, Wally Rothwell, said anywhere between $70,000 and $100,000 was needed to build demountable conference facilities at the Royal Exhibition Buildings site, and added that ATUG may have to foot at least $30,000 of the bill. If the necessary work could not be performed in time, the 1994 show would have to be staged at Darling Harbour again, he said.

From Riddell's point of view, given that the company 'owns' the exhibition while ATUG owns the name and earns a percentage, the space problem has an affect on profits; from ATUG's side, while revenue is important, the bigger issue has to do with keeping the troops happy. Riddell's position is that if Melbourne fails to come up with a suitable venue, a Sydney-Brisbane rotation would be a acceptable alternative.

The Queensland Push

Melbourne's troubles have been greeted with a hint of opportunism in Queensland, whose ATUG members only grudgingly accept the annual ATUG show pendulum between Sydney and Melbourne.

With a healthy telecommunications industry and Australia's fastest growing economy, not to mention a strong sense of its own unique identity, Queensland has made the point by staging its own State conference and exhibition for the past two years, and plans another one later this year.

The Sunshine State's biggest strength is that it now has around 14 centres with populations over 40,000, including Toowoomba, Cairns, Townsville and Mackay, and is thus a fertile region for telecommunications growth. It also has the kind of climate and tourist drawcards that would help attract more delegates from overseas.

ATUG Queensland Secretary, Jack Ellis, General Manager of QR (Queensland Rail) Telecommunications, conceded that some of his State members resented ATUG's Melbourne-Sydney focus. ATUG figures show Queensland with 93 members, compared with 525 in NSW, 318 in Victoria and 113 in Western Australia.

"We hope in future ATUG will come to Queensland," Ellis said. "It has been tentatively booked for Brisbane in 1996 at a new conference centre which is being built on the old Expo site on the South Bank," he added. Perhaps it's an omen that the centre will be built on the old funfair site. "It might be more fun up here," Ellis quipped.

In the meantime, Queensland members will continue to hold their own State conference and exhibition sometime around October, some five or six months after the national conference, with the specific aim of focusing on local Queensland issues.

Ellis said Queensland support for its own local conference was demonstrated by the large rise in attendance between 1991 and 1992. The 1991 conference and exhibition, which he described as a "voluntary, no frills affair" held in donated office space in Brisbane, had attracted around 150 people. The second event, a much more sophisticated affair held at the Hilton, had attracted more than 200. The participants were mainly local companies, with some interstate companies and the Queensland branches of the larger telecommunications companies.

Meanwhile in Melbourne, World Congress Centre management has been preoccupied with how to overcome the ATUG problem. One idea is to add a special conference section to the centre. A feasibility study has been carried out but no specific timetable has yet been drawn up.

World Congress Centre Manager Leigh Harry said he would naturally be disappointed if ATUG were to go elsewhere. But he was more patriotic about Melbourne as a show venue than he was concerned that the show stay at the World Congress Centre. So long as the show continued to rotate between Sydney and Melbourne, he did not really mind which Melbourne venue was used.

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Ericsson Makes a Comeback

After being forced to surrender Australian market share to major rival Alcatel, Ericsson Australia appears to have absorbed the shock and stamped its seal on enough local contracts to ensure its balance sheet continues to please its Swedish parent.

With the two transnational giants shadowing each other for virtually every contract and tender, both in Australia and internationally, Ericsson has emerged a winner locally with three major deals in recent months.

The jewel in the crown is its $200 million contract to supply digital cellular mobile equipment to third mobiles licensee Arena GSM, a deal which adds a new dimension to Ericsson's already substantial foothold in the analogue mobiles market through its longstanding relationship with AOTC.

Australian Communications understands that the Ericsson-Arena GSM deal was forged in London with dominant Arena partner, UK-based Vodafone, and that it was hotly contested by other large mobiles manufacturers, including NorTel and Nokia. The question of whether or not Alcatel made a pitch remains moot, with Ericsson claiming it did, and Alcatel claiming it didn't. But according to Arena GSM Managing Director, Philip Cornish, Ericsson's long-standing and substantial relationship with Vodafone — the world's largest mobiles operator with around 800 million subscribers in 10 countries, and hence Ericsson's largest customer — would almost certainly have meant that while Alcatel may well have had its hand up, it probably did not even get a look in.

The Arena GSM agreement sees Ericsson in on the ground floor as the key local infrastructure supplier until the end of 1996. The first year alone adds up to $60 million, with Ericsson supplying switches, base stations and base station controllers. These will be deployed across Australia over the next three years, as Arena launches digital cellular services in Sydney, Melbourne and Canberra by the end of September, covering the other major metropolitan centres from next year onwards. This timeframe leaves Arena not too far behind the digital cellular launches of both AOTC and Optus, which plan to go live some time this month; AOTC with its Ericsson and Alcatel GSM systems in different States, and Optus with its NorTel-Nokia network.

Much of the new Arena GSM equipment will be produced at Ericsson's 35-year-old Broadmeadows plant and headquarters in Melbourne, a massive five-storey complex with 1,500 staff involved in manufacturing, some 400 working on research and development and another 200 in administration. Some 250 sales and marketing staff are posted at State offices around the country.

The general move to GSM standards means that Ericsson must now have its eyes on two generations at once — analogue and GSM — both offering rich streams of revenue. The enormous infrastructure of MobileNet's analogue service, which started up exclusively on Ericsson equipment in 1986, must be maintained and expanded while GSM is gradually phased in, and Ericsson has won $38 million worth of business to do just that.

Under the contract, Ericsson will provide a new analogue switch for the Sydney network and new base station equipment for New South Wales, Victoria, Queensland, Western Australia and South Australia, the equipment is expected to be operational by the middle of the year.

Add to the list the $10 million contract Ericsson won earlier this year to upgrade between 60-70 exchanges in the public switching network. Not big biscuits compared to the other contracts, but confirmation of Ericsson's influence through its once unchallenged AXE technology. The contract involves the first implementation of AXE Plus, the latest switching technology to be offered by Ericsson since the introduction of the AXE and a direct counter-measure to Alcatel's System 12.

According to Tim Herring, MobileNet's General Manager, Digital Cellular, AOTC's awarding of similar-sized contracts in the $35 million range to both Ericsson and Alcatel for GSM equipment was an indication of how the Australian telecommunications market was opening up to competition. It also provided clear evidence of the new anti-monopolistic stance being taken by AOTC, which is seeking more flexibility with suppliers generally. The separate deals will effectively see Ericsson providing GSM equipment south of the NSW border and to the west, while Alcatel looks after NSW and the northern parts of the country.

Herring said that AOTC had spent some $100 million, much of it with Ericsson, on the analogue mobile network in the past year and that by the end of February, MobileNet had achieved a total 590,000 analogue subscribers. "We sold about 193,000 new units last calender year, and that put us ahead of Canada as the fifth largest in the world in terms of mobiles growth," he said.

"Our dealings with Alcatel and the acceptance of System 12 technology may well have scared Ericsson a little, but it's a big

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OTC Virus Claims Exaggerated

OTC may never really know how the networked PCs at its Sydney headquarters were infected by a virus recently. Figuratively speaking, OTC 'burnt the evidence' in an almost military-style four-day operation involving a team of around 30 information systems managers and others to cleanse the virus from the 1,200-odd networked PCs in its 16-storey Elizabeth Street building in Sydney. "We literally ripped the entire network apart over the weekend and then put it back together again, ready for use on Monday," said Senior OTC PC Network Administrator, Colin Jones.

While the network security breakdown sent shockwaves through AOTC and was brought to the attention of AOTC's Protective Services Division, claims that the virus could have infected networks carrying the corporation's 20,000 other PCs and shut down Australia's entire national telecommunications system were described as "rubbish" by former Manager Of Computer And Network Services, Gordon Rowell, who left the corporation to go into private practice as a contractor within weeks of the disaster.

Variously known as the Dudley, OZV2, or in OTC's case, the Clarkin, after the LAN administrator who detected it, the virus was first identified in Western Australia and Brisbane in January this year, but was not picked up by the McAfee anti-viral program installed throughout AOTC.

At OTC, the virus infected all executable files in Windows, enlarging them by about 1,200 bytes and causing dozens of PCs to crash one after the other. Ripping through PC hard disks, the virus infected up to 100 programs per second, causing the alarm button to be pressed and 15 networks to be shut down. But according to Rowell, the virus infected only a small part of the administrative network; it had no effect at all on the operations network and only a minimal impact on the day-to-day running of OTC's business. "It had the potential to go further, but we were able to isolate it within a few hours," Rowell said.

"We have always had standard good practices to prevent viral infections, and the upshot of this scare is that these have been beefed up." Rowell added that the most important change implemented in the wake of the scare was to ensure that all corporate data was stored on file servers, not on PCs. While the McAfee program has now been updated by its Australian supplier to recognise the Dudley virus, OTC has implemented a system whereby a signature of all PC hard disks has been taken. If changes occur on any of these, the PCs are automatically and immediately cut off from the network. "From now on, our PCs will be treated like intelligent terminals," Rowell said.

According to OTC's Colin Jones, while Protective Services carried out an exhaustive investigation and warned all AOTC departments, there was no point in conducting a witch hunt. He said there were still no clues as to just how the virus had entered the OTC system, but the best guess was that it had probably been brought in quite innocently on a work disk that had picked up a 'nasty,' or even on a computer game disk from a staff member's home computer.

One predictable effect of the disaster has been that anti-virus companies around the country have been flooding AOTC with their programs. While OTC will continue to make use of the McAfee software, which 12 months ago claimed around 65% of the United States market and a similar share locally, the corporation has reserved the right to examine all available products following the Sydney scare.

Bernard Levy

OTC Ties Up Exclusive ATVI Deal

AOTC's International Business Unit, better known as OTC, has succeeded in having rival carriers banned from advertising on ATVI, the new ABC satellite service into Asia, for at least nine months, as it seeks to strengthen its foothold in the Asian market.

An anti-competition clause in the OTC-ATVI agreement bars rival operators such as Cable & Wireless, AT&T, Sprint, BT, France Telecom and Singapore Telecom from becoming sponsors, at least until the deal comes up for review in October-November.

But OTC's General Manager, Marketing, Richard Vincent, told *Australian Communications* that while OTC had insisted on being the sole telecommunications industry sponsor during the maiden period, the Corporation was "realistic enough to accept the fact that come October, if ATVI enjoys the kind of success predicted for it, we may well be bidding for airtime along with the likes of BT and others. What we sought and won was the right to consolidate in Asia. At this stage we expect to continue our ATVI sponsorship deal beyond this foundation agreement."

Vincent said one of the benefits of the amalgamation of Telecom Australia and OTC had been that AOTC's international arm, which has a staff of around 2,000 derived from the former TAI and OTCI, could now draw on the expertise and support of another 68,000 staff at home.

Outlining OTC's long-term strategy, Vincent used an anecdote from his own experience in Asia: "Be humble, straight and patient." He said that faced with competition from huge global carriers with enormous clout and lots of money, OTC had to become even more competitive and be faster on its feet if it was to succeed in Asia.

Claiming the status of second largest Asian carrier of voice and data traffic behind the Japanese giant NTT, OTC has an even broader aim — to enter into arrangements with Asian companies and firms which have a local presence in the region. The corporation wants to build on its successes so far, which have involved installing and running customised networks for such diverse companies as IBM, airline reservation company SITA, and BHP.

Vincent said that under the tag 'Your Ideal Partner' in the ATVI spots, OTC was primarily concerned with convincing corporate and government decision makers of the benefits of doing business with the corporation. "We want people at the top to see us as more friendly to deal with," Vincent said. "We've already had positive feedback from the ads, especially from Hong Kong."

Interestingly, the name 'AOTC' is not being promoted on ATVI. All the ATVI advertisements and advertorials carry the OTC logo, as do all the Corporation's business offices in the Asian region. The reason for this is that OTC is already well established as a business name in Asia, and AOTC is regarded as referring to the domestic Australian operation.

Making the Right Pitch

To ensure ATVI sponsorship spots have the right cultural pitch for Asia — rather than a brash Australian approach that may be misunderstood or cause offence — OTC has hired the services of the Batey Kazoo agency, a subsidiary of Singapore-based Batey advertising group run by Australian expatriate Ian Batey, which is regarded as being strongly committed to boosting Australian exports in general. Batey Kazoo is also responsible for placing advertisements in regional publications such as the *Asia Bulletin* and the *Far East Economic Review*.

The agency has produced three different 30-second advertisements for OTC, which are shown 18 times a week during ATVI's eight hours of broadcasting during the evening hours. There are also a couple of advertorials lasting two to three minutes, which detail OTC's achievements in Asia as well as promoting the benefits of dealing with OTC in the future.

The target market, presently estimated to be around four million and growing fast, is limited only by the number of reception dishes within the Palapa B2P satellite footprint, which covers Indonesia, Thailand, the Philippines, Hong Kong, Taiwan, Brunei, Laos, Cambodia, Malaysia, Burma, Singapore, southern China, Papua New Guinea, and Bangladesh. The audience estimate is derived from the number of people who have access to each satellite dish and the number who speak English. These vary considerably, with the heaviest concentration of viewers in government employee residential districts, upmarket suburbs occupied by business people, and major resorts and hotels. The ATVI service is already being carried by large hotel group Hong Kong and Shanghai Hotels at its Peninsula Hotels in Hong Kong and Manila .

Meanwhile, OTC has confirmed that it would also be interested in advertising on a new commercial Asian network being planned by Australian media tycoon Kerry Packer, using the old Topaz television facilities in Darwin. While the service is still under discussion, Richard Vincent said that OTC would make a decision based on the kind of programming being planned for the station. "Home Box Office is now into Asia, as is CNN, the BBC and ATVI. There is big potential for an entertainment station, and if that's what Packer plans, we could very well choose to advertise on the new channel."

Since its launch in mid-February, ATVI has been energetically seeking between 10 and 15 foundation sponsors, and has demonstrated its commercial resolve by conducting a direct mailing campaign and hiring former marketing manager with the *West Australian* newspaper, Amos McKegg, to knock on the appropriate corporate doors.

With sponsorship packages ranging in cost from $55,000 per month to $145,000 for three months, $260,000 for six months and $500,000 for a year, ATVI has modest expectations of raising "considerably less than $6 million," according to the service's Project Director, Bruce Donald.

Donald said the new satellite service was the ideal vehicle for OTC to strengthen its position in Asia. OTC's sponsorship would be of assistance to the 80-100 Australian exporters to the Asian region, many of which are telecommunications companies, he said.
Bernard Levy

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and efficient organisation and has already bounced back," Herring said.

While it celebrates the fact that it has partly cracked Ericsson's formerly exclusive domains of switching and mobiles, especially digital cellular mobile of which Ericsson claims a 70% market share worldwide, Alcatel continues to look after its bottom line by maintaining a heavy focus on supplying transmission equipment and new public telephones, along with submarine fibre optic cabling and equipment.

But Alcatel knows only too well it must spend a penny to make a penny. Last year's net loss of around $13 million, on turnover of $600 million, Alcatel puts down to start-ups such as building the new System 12 manufacturing plant at Liverpool in Sydney and the on-going development of its Remote Integrated Multiplexer (RIM).

Given the nature of the rivalry between Ericsson and Alcatel in Australia, and the highs and lows of converting technological theory into workable, deliverable products as quickly as possible, any real assessment of either company's financial performance would only be half complete without taking a close look at the other's.

Both have maintained a presence in Australia for a century, originally supplying such leading edge products of their day as desk set and wall unit telephones, and thereby deeply ingraining themselves into the fabric of Australia's telecommunications infrastructure. Both are still doing very nicely, thank you, tough times notwithstanding, and in that brave new world called Competition Down Under, this particular battle of the titans is a long way from the final bell.
Bernard Levy

IT'S HARD TO GET A PHONE CONNECTED WITHOUT GOING THROUGH JNA.

Telecom's customer service is really switched on with the help of network communications technology from JNA.

This technology, integrated with Telecom's AUSTPAC service, forms what is arguably Australia's largest OSI network. Operators throughout Australia now field all kinds of customer enquiries from a single desktop PC, accessing and exchanging data from three different computer systems - IBM, Honeywell and Digital.

Previously, three separate terminals would have been needed to do the same job.

JNA's Network Integration knowledge is at the forefront of today's climate of open environment computing. JNA's engineers are the quiet achievers assisting Australian industry for over 30 years.

If your needs are to distribute the computing power of your organisation, a phone call to JNA could have you well connected.

Sydney 417 6177 Melbourne 532 8555 Canberra 248 5422
Brisbane 870 3434 Perth 481 4034 Adelaide 338 2511 Darwin 81 1499

JNA

POINTING THE WAY TO CLEVER COMMUNICATIONS

Telecom Goes Talkabout

Unfazed by very mixed results overseas, Telecom last month launched Talkabout, its new CT-2 product.

There's been a lot of misconstruction about the reasons why the UK experiment in Telepoint personal pocket phones failed so dismally a few years ago. In the crash, the four major players each dumped a few million dollars in assets and about four thousand 'early adopters' got burned with unusable handsets — only the 'Rabbit' system (which hadn't really got started) survives today, but it doesn't seem to be making much headway.

The UK collapse convinced many technocrats worldwide that small pocket-portable cellular systems were simply not a viable proposition. But closer examination of the evidence doesn't bear out that conclusion. Telepoint failed in the United Kingdom for these reasons:

- There were four licensed players all entering the new market at the same time. It was economic rationalism gone mad.
- During the early stages the handsets of one group couldn't use the base stations of the others — their 'air-interfaces' were incompatible.
- Government licence restrictions mandated that these must be 'castrated' cellular systems, unable to accept incoming calls. They were to be outward calling (one-way) only with paging to provide the inward signalling link.
- Paging was not available in the early handsets.
- The cellular mobile marketplace was ridiculously distorted by legislation creating an extra layer of resellers between the customer and the carriers — for the sale of air-time, as well as handsets. To attract customers for their continuing air-time revenues, the resellers were virtually giving away 'full-cellular handsets' in order to attract business. So why buy a Telepoint handset for $600, when a cellular handset could be bought for $200?

The UK Government, to its credit, recognised that their policy of 'letting the market decide' the technology and of permitting open competition had proved to be disastrous — so eventually it mandated that all Telepoint handsets must migrate to use a Common Air Interface (CAI) in addition to their proprietary standard. It was the right move at the wrong time because it threw fear, uncertainty and doubt into the marketplace.

It was about this time that the Europeans began talking about CT-3 ('two-way' Telepoint) and they set out to develop a new pan-European standard called DECT which was promised 'early in 1990.' GSM also began to creep into the popular lexicon (promised mid-1991) and that was 'digital' and 'portable' as well.

About this time the UK Government upped the anti-European ante by announcing the development of Personal Communications Networks (PCN) using GSM in the GigaHertz range. This was to be a semi-cellular, semi-pocket, semi-local loop substitute — yet another possible choice.

Is it any wonder that the public were totally confounded and confused?

The three companies competing in London had base stations scattered everywhere in the inner city, but few in the outer suburbs, so coverage was patchy. And the low-power technology proved to have poor physical penetration; you needed to be in clear line-of-sight to most base stations to get good reception, and passing trucks and cars in the street caused all sorts of fades and interference. Someone once said that to get continuous conversation you needed to put one hand on the antenna, and have the other touching a base station.

Relative Success in Asia

There's been a bit more common sense in the rest of the world with the introduction of Telepoint, and it has proved to be viable in Canada, France, Singapore and Hong Kong, and recently in China. There's been a growing realisation that these little pocket units make a lot of sense to a lot of people in a lot of the world's cities — and they also provide a cheap way to 'wire up' the cities of third-world countries.

China has just signed $90 million network contract with Motorola for Telepoint in three Chinese cities — Dalian, Shaoxing and Panyu — and it is anticipated that China will be the world's largest market for this technology by end of next year. The first trial was held in Shenzhen, beginning last August, and it now has 10,000 users, which is proportionally more than Hong Kong — the great success story until now. Motorola expect to have contracts for 15 new Chinese city networks by the end of 1994.

To the businessman/woman in the developed world Telepoint is especially useful when the phones double as mobile PABX extensions in the office. Strictly these are known as CT-2 or CT-3 systems; it is not correct to talk about these as 'Telepoints,' since this term is applied now only to public-access networks. Used internally in an office,

the air-link costs are avoided, and the company only pays a normal line-link cost for each external call.

And you can take this usefulness further: Telepoint handsets can provide a short-distance ('satellite') link to a much larger cellular-mobile transmitter on trains, ferries and aircraft — or you can use them to 'satellite'-link from, say, a building site to a cellular mobile unit built-in to you car. At home they can become a cordless phone just by adding a home base station.

So this 'general purpose' pocket mobility appears to be the marketing position, and it is certainly the direction in which the CT-2 and CT-3 technologies are now going.

Talkabout's Brisbane Trial

Telecom has just announced an on-off-on-again service launch of 'Talkabout,' its new CT-2 service, in Brisbane. This is not a trial, it says, but a full-scale launch. It is using the new Motorola handsets made in Penang, Malaysia, which Motorola is now selling in

Talkabout Billing Plans

Talkabout will be introduced with two billing plans, with a third offered later. You can opt for which ever plan or service suits your needs.

1. Basic
Equivalent to the UK's one-way service, this will cost $10 a month and 29 cents a minute during peak periods for all calls made within three pricing districts (say, 85kms). Off-peak the rate is halved to 15 cents a minute.
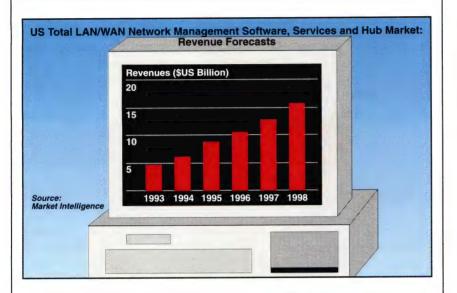
2. Regular
The regular service will provide you will a personal number, voice-mail and two-way calling. It will cost you $18 a month and you'll pay the same call-out rate as above. When you receive calls, the caller is charged the normal PSTN rate required to reach Brisbane, and the Talkabout subscriber will pay an additional 19 cents a minute for the radio link. Voice-mail is free, but Telecom will make its money from your need to call in to collect your messages.
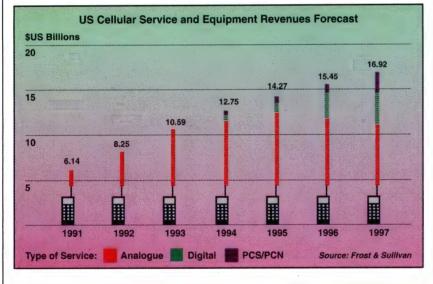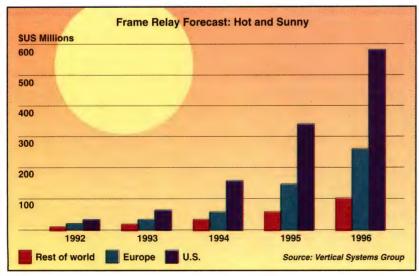
3. Paging
The third payment plan will also be charged at $18 a month, but for this you will get only the basic (one-way) service plus integrated paging. Paging will be built in to the handset eventually, but at present it is only available as a separate unit. This service is for people who don't want to be interrupted by calls.

Market Watch

US Total LAN/WAN Network Management Software, Services and Hub Market: Revenue Forecasts

Revenues ($US Billion)

| 20 |
| 15 |
| 10 |
| 5 |

1993 1994 1995 1996 1997 1998

Source:
Market Intelligence

US Cellular Service and Equipment Revenues Forecast

$US Billions

| 20 |
| 15 |
| 10 |
| 5 |

| 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
| 6.14 | 8.25 | 10.59 | 12.75 | 14.27 | 15.45 | 16.92 |

Type of Service: ■ Analogue ■ Digital ■ PCS/PCN   *Source: Frost & Sullivan*

Frame Relay Forecast: Hot and Sunny

$US Millions

| 600 |
| 500 |
| 400 |
| 300 |
| 200 |
| 100 |

1992 1993 1994 1995 1996

■ Rest of world ■ Europe ■ U.S.   *Source: Vertical Systems Group*

large numbers to the Chinese. These all use the older UK-standard for the Common Air Interface (CT-2/CAI) which is only slightly different from the new ETSI CAI standard which is due for release this month.

Everyone assures me that there's no appreciable difference, and that the international ETSI standard can be implemented later without disadvantaging the first buyers.

Brisbane was chosen as the trial city (sorry 'launch city'!) for marketing reasons says Albert Sommers, Telecom's Talkabout National Manager. "It's ideal," he says. "Brisbane has the highest cellular penetration of any capital city, and it's at the hub of biggest growth centre in Australia. Talkabout will suit the Brisbane lifestyle, which is very mobile because of the climate."

The initial coverage will be for Brisbane city and its metropolitan area only; it won't extend to the Gold Coast. There will be 110 base stations in the central business district providing blanket coverage, and another 500 base stations in shopping malls, airports and at convenient places along main highways — mainly at service stations and post offices. Telecom has tied up the local BP Service Stations, and it will soon have every McDonalds in the Brisbane area fitted out with a base transmitter.

Telecom has chosen to use GPT network equipment (mainly for public base stations), with Motorola supplying handsets and private (home) base equipment. NorTel also have a tie-up to provide CT-2 adaptations for company PABXs.

A Two-Way Service

Talkabout is to be a public two-way system, so the base stations and network installations are a bit more complex than the original UK service. With a call-out-only system the network doesn't need to keep track of the location of the handsets, so base stations on these simple networks are treated much as a normal terminal on the end of a standard PSTN line. The head office will use once-a-day polling of each terminal to exchange information — billing coming in and authentication-check data going out.

With Brisbane's two-way calling, the user must 'register' with the local base station by pressing a button on the handset, and this information will then be passed back to a central location register on a regular basis — so this requires much greater network infrastructure. If you haven't registered recently, and/or the switching centre can't locate you, then calls can be diverted to a voice-mail box. As you would expect, this involves Telecom in much more capital outlay than the United Kingdom model, and so the usage costs will be higher.

Where these PACT (Public Access Cordless Telephone) services will differ from MobileNet and GSM is that there's not the

Network Management

SNA or SNMP: Why Not Choose Both?

As networks grow and budgets shrink, network managers are under increasing pressure to integrate net management systems. Fewer consoles are easier to read, cheaper to run, and they provide better control over the network.

But integration can be a tough call when IBM Systems Network Architecture (SNA) gear is linked to interconnected LANs. In these hybrid networks, two network management systems must coexist: IBM's mainframe-based NetView and simple network management protocol (SNMP) systems that use TCP/IP protocols and typically run under Unix. In many organisations, the two management systems have an equal share in handling equipment, yet they function in separate worlds, even in separate locations.

A wave of products and standardisation efforts promises to help relieve the headaches that arise from maintaining two management systems. Among the recent developments are software gateways that translate alerts between NetView and SNMP systems; more sophisticated applications that act as agents, converting NetView data to a format compatible with a specific net management platform; and multiprotocol management systems that handle both SNMP and NetView information.

In addition to these general trends, several vendors plan to put conversion utilities directly into their operating systems. Novell, for instance, is currently at work on an application that will bring NetView alerts to its NetWare Management System (NMS).

Putting MIBs to Work

Also in the works are SNMP management information bases (MIBs) that will enable SNMP management systems to obtain information directly from SNA devices, entirely bypassing NetView. A leading proponent of this approach is Kevin Tolly, President of Interlab and director of the Data Comm Test Lab. Tolly is leading a group of gateway vendors that hope to start an Internet Engineering Task Force (IETF) working group in the second half of the year to define an SNMP MIB for SNA gateways. The group aims to devise a set of MIB II extensions that enable any standard SNMP system to manage SNA elements such as Logical and Physical Units (LUs and PUs) through a gateway.

All these solutions will help consolidate management information, but they won't eliminate the fundamental choice between a product that supports mainframe NetView and one that supports SNMP.

The Move to SNMP

In the past few years, the overall trend has been away from NetView and toward systems that use SNMP and Unix. Platforms such as Spectrum from Cabletron Systems, Openview from Hewlett-Packard, AIX Systemview NetView/6000 from IBM, and Sunnet Manager from Sunconnect fit a general trend toward downsizing from mainframe-based networks to distributed ones. They are more versatile than NetView and support a wider range of popular standards.

Cost is another selling point for Unix-based systems. "Unix-based management systems are cheaper to run" than mainframe-based ones, asserts Rob Pavlat, Senior Telecommunications Engineer at US-based Travelers Insurance. Pavlat says his group is examining products such as NetView/6000 to help consolidate information about Travelers' network of 200 bridged Token Ring LANs. At each site, workstations emulate 3270 terminals to share host applications.

IBM itself seems to be setting up NetView/6000 — and not mainframe-based NetView — as the true point of integration for its growing roster of management products. The current line-up includes mainframe NetView, LAN Network Manager, and the LANfocus series (which was renamed IBM LAN NetView in December 1992).

The available products that merge SNMP and NetView data offer a vast array of approaches, each with its own set of benefits and drawbacks. Gateways are relatively inexpensive and simple to install. Versions are available that run with NetView or with Unix-based SNMP management systems, converting SNMP information to NetView alerts, or vice versa (see table).

Vendors of gateways that operate from NetView include Proteon, SynOptics Communications and Ungermann-Bass.

On the Unix side, US-based Brixton Systems offers gateways that translate NetView alerts to the format of either Sunnet Manager or HP Openview. Brixton also offers a set of generic application program interfaces for constructing Unix-to-NetView gateways.

Even though gateways are cheaper and simpler than other types of SNA/SNMP management products, there are trade-offs. Most gateways don't support alerts other than those written in NetView's Network Management Vector Transport (NMVT) for-

Selected SNA/SNMP Management Products

VENDOR	PRODUCT	DESCRIPTION
Ascom Timeplex	Time/LAN 100 Element Management System	Management system for vendor's LAN gear handles NMVT and SNMP data
Cabletron Systems	Bluevision	Agent application for vendor's Spectrum network management system
Digital Equipment Corporation	Polycenter SNA Manager	SNA agent application for DEC Polycenter Network Manager
Fibermux	Lightwatch	Management system for vendor's hubs and muxes handles NMVT and SNMP data
IBM	IBM AIX NetView Service Point Version 1 Release 2	SNMP gateway for NetView
General Datacomm	Internetworking Management Software (IMS)	Management system handles NMVT and SNMP data
NCR	Starsentry	Management system handles NMVT and SNMP data
Proteon	SNMP-to-Netview Gateway	OS/2-based gateway converts SNMP data from Proteon CNX routers and Series 70 and 90 hubs to NMVT format
Sunconnect	Sunlink SNA Peer-to-Peer	SNMP-to-NMVT gateway for Sunnet Manager
SynOptics	Netmap	OS/2-based gateway converts SNMP data from SynOptics Ethernet, FDDI, and Token Ring LattisNet hubs to NMVT format
Ungermann-Bass	Access/View	OS/2-based gateway converts SNMP data from LANs based on vendor hubs to NMVT format

NMVT = Network Management Vector Transport   SNMP = Simple Network Management Protocol

SynOptics Launch ATM Line at Com Tech Forum

Any mention of asynchronous transfer mode (ATM) to most network managers is likely to conjure up images of huge WAN switches and 10,000-node networks. But the fact is that ATM is also poised to play a major future role fulfilling the bandwidth needs of applications like LAN interconnect, videoconferencing and multimedia.
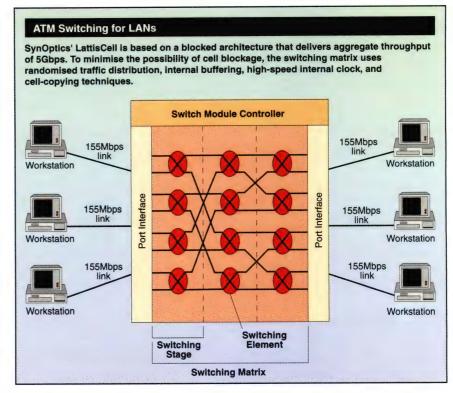
At least one LAN vendor, SynOptics Communications, has gotten the message: Its new LattisCell ATM switch can be employed as a LAN hub that gives users 5Gbps throughput. Although other major LAN hub vendors have announced ATM strategies for their products, SynOptics is the first to announce an actual product; the LattisCell is scheduled to ship in the US in July and Australia sometime in the third quarter.

To underline the importance of Lattis-Cell, SynOptics President and CEO, Andrew Ludwick, travelled to last month's third annual Com Tech Open Systems Forum to launch the product in Australia. Speaking at the Forum, which was held on Queensland's Sunshine Coast and attended by over 400 delegates, Ludwick admitted that ATM was still a way down the track for most users, but maintained that "For the small number of people who want to go and do it now, ATM is a reality." That small number may be as few as 20 in the US this year, but part of SynOptics' strategy is to establish the reality that the company has a robust ATM product line, he said. "The customer who says 'I know I'm going to run out [of bandwidth] at some point' wants to know that ATM is in the vendor's architecture."

Sun Adaptor Card Due

To help the LattisCell function as a LAN hub, SynOptics is introducing its ATM SBus adaptor card that links Sun Microsystems workstations to the switch. Due by year's end and priced at $3,805, the adaptor will occupy a single slot in SPARC 1, 2 and 10 workstations. The vendor also plans to develop an ATM card that will plug into its existing hubs, enabling the hubs to connect to a LattisCell acting as a backbone.

The LattisCell will be sold in two versions: The Model 10102, which will be priced at $70,000 in Australia, with 12 shielded twisted pair and four fibre optic ports; and the Model 10104, priced at $93,355, with 16 fibre optic ports. Both versions will run two software packages: The LattisCell Connection Management System (CMS) and the LattisCell Network Management Application (which is priced at $10,220).

ATM Switching for LANs

SynOptics' LattisCell is based on a blocked architecture that delivers aggregate throughput of 5Gbps. To minimise the possibility of cell blockage, the switching matrix uses randomised traffic distribution, internal buffering, high-speed internal clock, and cell-copying techniques.

Rob Newman, Group Product Line Manager for ATM at SynOptics, credits the LattisCell's low price and high performance to design innovations like application-specific integrated circuits developed for the switch and the use of a fast scalable switching algorithm that was comparatively easy to implement. That ATM chipset is looming as SynOptics' trump card, and the company is in no hurry to licence its technology. Although he wouldn't rule licensing out, Ludwick confirmed that "there is no market development strategy based on that."

Inside the LattisCell

The LattisCell is composed of a switching matrix, 16 port interfaces, and a switch module controller (see figure). The switch matrix is based on a blocking design, the Fast Matrix Architecture (FMA), that is inherently faster than nonblocking approaches; the new LattisCell's claimed 5Gbps throughput is roughly double the throughput of other ATM switches. FMA can also boost throughput in four other ways.

First, the matrix uses randomised traffic distribution, which minimises the chance that cell blockages will occur. It works by attempting to route transmissions over as many different paths through the switch as possible.

The switching matrix has several stages of switching elements. Each element has two inputs and two outputs, and each stage consists of a bank of switching elements. When a transmission comes in to the first stage of the device, a switching element randomly chooses to pass it through one of its two outputs. The output of the first stage becomes the input of the second, and so forth. This process ensures that transmissions are evenly distributed throughout the switching matrix, sharply reducing the chance that transmissions will be blocked.

Second, each switching element has a buffer large enough to hold a few ATM cells, a capability known as distributed internal buffering. Cells can be buffered to avoid congestion and to be duplicated for multicast applications such as videoconferencing.

Third, the switch's internal clock runs at 5Gbps — twice the aggregate throughput of the unit's 16 ports, which operate at 155-Mbps. The fast clock gives the unit ample time to process cells, and it aids in minimising blockage.

Finally, the switch supports cell copying, a useful feature for multicast applications. To handle multicast transmissions — those in which input from one port is broadcast to multiple ports — the switch effectively behaves like a miniature ATM network. Each switching element checks to see if it needs to copy a cell for multicasting. If so, the element makes two copies of the cell and passes them through both of its outputs.

The LattisCell's port interfaces (PIs) are cards that connect attached workstations to the switch. The PI uses a line-coding scheme called 8B10B, in which eight bits are encoded and transmitted as 10 bits in order to maintain clocking. The switch module controller handles such features as call setup and network management. The CMS software employs a proprietary call setup scheme, since the ATM Forum has not yet developed standard specs.

Johna Till Johnson

mat, although IBM offers a range of other SNA alerts. And when it comes to SNMP, some gateways work only with selected devices or management systems. For example, OS/2-based gateways from Proteon, SynOptics and Ungermann-Bass convert SNMP information into NetView alerts only for these vendors' own devices. Notably, Netassist, a vendor of NetView-based products, licenses Proteon's gateway to users and integrators for use with any SNMP compliant device. But Netassist doesn't bundle the gateway with the ready-made MIBs that Proteon offers.

Moreover, one gateway will usually be able to take information from just one host, so users of multiple hosts running NetView will have to buy multiple gateways. In contrast, more expensive products that provide a deeper level of integration between NetView and SNMP systems — such as Polycenter SNA Manager from Digital — also may support communications with more than one host.

Beyond Gateways

An emerging breed of application goes beyond gateway functions, acting not as translation utilities between NetView and SNMP-based systems, but rather as agents that collect SNA and SNMP management data on behalf of a network management platform — usually, but not always, a platform running under Unix.

Agent applications are available from Cabletron, Digital and Peregrine Systems. These products offer much more information about network devices than do gateways, since they tap both NetView alerts and other sources of SNA information that aren't keyed to alarms, such as IBM's Virtual Telecommunications Access Method (VTAM), a mainframe subsystem that controls access to SNA hosts.

On the down side, the offerings are complicated and expensive. What's more, they usually involve multiple components — in some cases, multiple hardware components. For example, Digital's product, created with software developer Systems Center, allows Digital's Polycenter Network Manager (formerly called DECmcc Director) to directly manage most SNA devices attached to IBM mainframes running Systems Center's Net/Master. But it requires the use of a hardware gateway and extra LU6.2 software on the management workstation as well as at the Net/Master host.
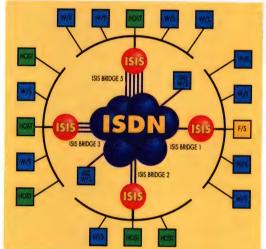
Bluevision was developed for Cabletron by Nettech, a team of ex-IBMers that develops software and provides contract services for managing SNA networks. The product includes mainframe software and Cabletron's Spectrum, the vendor's network management system. Bluevision collects not only standard NetView NMVTs and VTAM

information, but also Management Service Units (MSUs), which are expanded alerts offered only in NetView 2.2 or later. This data is filtered according to a set of user-defined parameters, and all of its is fully integrated with SNMP data in spectrum applications and displays.

Bluevision looks like it could be a winner, but users who want it must commit themselves to Spectrum and to the latest version of NetView, even if users don't need MSU data. According to IBM, NetView Version 2 costs 20% more than Version 1, even for users who are upgrading. Notably, Nettech says it was considering adapting Bluevision to fit earlier versions of NetView.

In a class by itself is California-based Peregrine Systems' OpenSNA. Comprising software for mainframes and Unix worksta-

tions, OpenSNA gathers SNA management information directly from VTAM, bypassing NetView completely. It then transports the management data using the common management information protocol (CMIP) over TCP/IP (CMOT) or LU6.2 to Hewlett-Packard's Openview Network Node Manager, where OpenSNA converts it to the format Openview uses for its display and event monitoring. OpenSNA in effect creates an SNA agent for Openview.

But on the down side, while OpenSNA brings both SNMP and IBM Systems Network Architecture information to Hewlett-Packard's Openview, the current release doesn't yet allow both types of data to be used together in reports or other applications. That capability is planned for release early this year.

Related to these sophisticated multipart solutions are multivendor management systems with inherent abilities to handle NetView alerts and SNMP data within a single network management system. Among these are systems from MAXM Systems, Applied Computing Devices, and Objective Systems Integrators (OSI).

OSI's Netexpert deploys its own Unix-based gateways to draw SNA and SNMP information into its system. The Netexpert SNA gateway intercepts the flow of ASCII information NetView sends to its printer. MAXM Systems' new product, Multivendor Automated Expert Manager (MAXM), incorporates an OEM'd version of NetView/6000. It also provides an OS/2-based graphical front-end for mainframe NetView.
Mary Jander

Talkabout from page 28

cellular/mobile complexity needed to provide hand-off between cells and to constantly poll the handset to maintain a location register.

You can have PACT low-speed (walking pace) hand-off in such a network, but currently this is only provided within PABXs to allow users to roam around a factory complex. However Telecom is now considering providing hand-off within airports and shopping malls to retain contact with people on the move.

You don't even need to purchase a handset from Telecom to use the Talkabout ser-

vice. Other handset distribution channels will be available from Day One, probably selling the Shaye-made handsets (these were the most popular in the UK) or those made by Ferranti which invented the system. Dick Smith seems to be gearing up to import some cheaper handsets from somewhere, but they won't talk.

Be warned that if you bring in a Shaye, Ferranti or Motorola handset from overseas, it will need to be retuned to a different frequency; Australia has chosen the slightly non-standard 861-to-865 MHz range while Hong Kong, Singapore and Europe have all used 864-868 MHz.

CT-2 uses Frequency Division (FDMA) digital communications in a 'ping-pong' (or TDD — Time Division Duplex) fashion. with the two sides of the conversation alternating very quickly within a single 100 kHz channel. Forty different channels are provided in the 4 MHz band of allocated frequencies, and about six channels can be handled by each Telepoint base station. CT-2 uses a two-level Frequency Shift Keying modulation scheme with a voice modulation rate of 72Kbps.

Signalling between handsets and base is by way of the embedded sync bits contained within each voice/data frame, but this is not true 'in-band' signalling. CT-2 is more attuned to analogue PSTN than to the new ISDN telephone network. It is not designed to carry ISDN's special features over the radio link — but it is intended to be used with an inbuilt numeric pager transmitted via the standard paging system.

Pricing the Key

The Motorola handsets to be sold through Telecom will set you back $499, and if you buy one with its own base station for the home (plus charger) then they'll drill you for $999. I'd bet that the Chinese aren't paying anything like this amount for their new CT-2 units! I'd be interested to find out just what the Chinese price is.

Glossary

CT-2

The name for this technology now encompasses the old one-way Telepoint telephone system which failed so dismally in the UK, and the new versions which were once called CT-2 Plus or sometimes CT-3 to indicate their 'two-way' capacity. The distinction has now often been lost. So the general term CT-2 can mean the original chaotic one-way standards, or those arising from the mandatory Common Air Interface (CAI), or the extensions which allow two-way calling.

Common Air Interface (CAI)

The UK Government mandated that all CT-2 pocket phones were to migrate to use a Common Air Interface, which would then allow any handset to be used with any base station. Instead of solving the problem, this just added to the fear, uncertainty and doubt. Eventually the UK ended up with a CAI, and the Europeans (ETSI) modified this to create what is now known as CT-2/CAI which is the standard most widely used around the world. Austel has decreed that this is the standard Australia will use, but with some frequency modifications.

CT-2 Plus

This term is used in different contexts and it has no official standing anywhere in the world outside Canada. Like CT-3 it tends to denote a two-way system with limited hand-off. CT-2 Plus (what we would call CT-2/CAI) is about to be introduced by four operators in Canada — but confusingly, they also use the term to refer to an evolutionary standard still under development. In the Canadian context, the 'Plus' appears to refer more to enhancements to the supporting network, rather than changes to the basic handset technology.

Telepoint

A general term being applied now to CT-2, CT-3 and DECT 'cordless' telephone systems used to access the public switched network. The distinction is with the same technologies being used to provide links to company PABXs and home base stations.

PACT

Public Access Cordless Telephone. The Australian term for Telepoint systems. It is distinguished in the Austel regulations from mobile cellular by the lack of hand-off provisions — but the main distinction is in power, range and coverage area.

CT-3

Ericsson use this term for their DCT900 standard cordless PABX system. This is a pre-DECT development which is quite different from CT-2 technology, but it has built-in potential for Telepoint operation (given the network support). Ericsson seem to have given up any plans to market it for this use, and is selling CT-3/DCT900 as a cordless PABX technology only. This is probably because the cheaper CT-2 standard has survived the UK fiasco, and also because they see the imminent introduction of DECT as having even more potential.

DECT

Digital European Cordless Telephone was derived from Ericsson's DCT900 standard, but modified in a number of ways. Where CT-3 can carry three channels in its time-slots, DECT has eight. DECT was designed specifically for cordless PABX, wireless LAN and ISDN applications, so it is almost certain to become the pan-European standard for PABX and Telepoint operations. It is due for release this year.

This handset and home base station cost could be the killer of this system, no matter how good the technology, or how well the service is implemented. Traditional marketing theory, which appears to be Telecom dogma these days, says that it should charge like wounded bulls for handsets initially, and skin the early adopters to recover development costs. But I suspect that Telecom hasn't recognised that the yuppie element will already have their cellular phones — and these are perceived by the public to be part of the same market.

Despite Telecom's best promotional efforts, I wouldn't bet on Talkabout being seen as anything more than 'cut down' or 'poor man's' cellular — and the early adopters may not be willing to pay $500 to $1,000 for their units when cellular prices are decreasing steadily.

There's also a question as to the claimed productivity benefits that many companies will find by introducing this portable technology. NorTel will introduce its PABX adaptor later in the year — but what happens when an employee leaves his phone at home if it's the sole connection. Obviously CT-2 in the office must be in addition to the wired network connections, not instead of it .

Qantas did a trial run of CT-2 for in-house use a year or so ago, but no one at Qantas is willing to talk about how successful — or unsuccessful — this trial was. Ericsson has also had a couple of company trials of its CT-3 version. What is noticeable about the PR handouts is the lack of enthusiastic reports from these trial companies. Qantas seem to have given their system back.

CT-3 and DECT

Ericsson has recently released its CT-3 technology once again. The company has been launching CT-3 every 12 months or so for the last half-decade (it seems). But this time there was some product to show, and it appeared to be working back to a base station.

Ericsson tried to sell its technology (then known as DCT900) to ETSI (the European standards organisation) a few years ago as the European cordless standard, but ETSI decided to modify the technology to make it less dependent on Ericsson patents, and it also changed frequencies to create the DECT (Digital European Cordless Telephone) standard — due for first product release this year.

Ericsson's CT-3 standard is intended for in-house use with a company PABX, although it has all the necessary facilities to allow it to be used as a Telepoint system if required. It won't be. There are both licensing restrictions, and the fact that DECT will enter this market this year.

CT-3 uses TDMA/TDD technology and currently it provides four carriers in the 800-900 MHz band with each base station. Each of these carriers is 1 MHz wide, and they are subdivided by time into 8 duplex sub-channels (16 time-slots), giving a total of 32 full-duplex 32Kbps encoded voice channels overall. It has seamless hand-off, is able to carry data also (not really available in CT-2). There's also a wireless LAN and fax facility under development.

Ericsson, through natural attrition, now 'own' the CT-3 name. Most other European companies interested in CT-2 and CT-3 developments shifted their R&D over to concentrate on DECT. This has almost the same technical specifications as CT-3, but it will operate at 1.8-1.9 GHz, which gives it more potential for in-office data transmission.

DECT is as much a wireless LAN technology as it is a pico-cellular phone system, although it still will be useable for Telepoint operations and it can provide the same type of satellite links to cellular systems on public transport, etc. The Europeans are obviously having trouble getting this new digital radio TDMA technology to work as well as promised. DECT is now a couple of years delayed on the original introduction date — but then again, so is CT-2, CT-3 and GSM!
Stewart Fist

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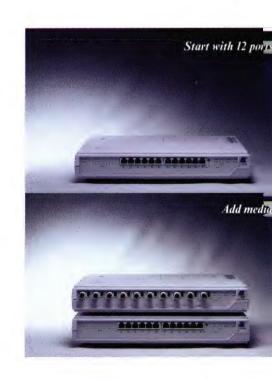
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Delivering E-Mail for the Enterprise

Developers of e-mail systems are getting a message from users: It would be nice to send e-mail anywhere in the enterprise network without dealing with the complexities of the many systems involved. Fortunately, the message seems to be getting through. No fewer than five messaging APIs have been put forth for LAN-based e-mail systems, and vendors are rushing to support the CCITT's X.400 messaging recommendation.

Like the corporate internets they traverse, enterprise-wide mail systems link disparate, geographically separated groups of users. Unlike general-purpose backbones, however, the ultimate goal of an enterprise-wide mail system is to add mail capabilities within users' applications. That poses a challenge for application developers, who must integrate the services of back-end mail systems into their front-end user applications. LAN-based application program interfaces (APIs) help ease the integration process.

Messaging APIs give developers a predefined interface to an application and a set of messaging services. These services include a simple message-passing capability; the ability to receive and read messages; a way to attach binary files to a message; and possibly some form of addressing service to help route mail. Generally speaking, messaging APIs are independent of the transport mechanism that carries the message from one point to another.

The APIs' messaging services let users' applications communicate with each other and with a server in a store-and-forward fashion. As a result, developers and users are shielded from the underlying messaging system that routes and delivers the data. Thus, a developer can concentrate on writing an application without needing to become an e-mail expert; the API negotiates with the programming interfaces on multiple platforms and messaging systems. The API also simplifies the development of mail-enabled applications by providing all messaging services through a single interface.

Five Contenders

On LAN platforms, the five APIs battling to control the link between users' applications and the message transport process are: The Vendor Independent Messaging (VIM) API, backed by a consortium led by Lotus Development; the Messaging Application Prog-

ramming Interface (MAPI) developed by Microsoft; the Common Mail Calls (CMC) proposed by the X.400 Applications Programming Interface Association (XAPIA); the Standard message format (SMF) developed by Novell; and the Open Collaboration Environment (OCE), which includes mail APIs developed by Apple Computer.

At the moment, the VIM API seems to be winning the battle. Numerous vendors say they'll add VIM support to their applications — including some companies, such as Apple and Novell, with messaging APIs of their own. Both Apple and Novell were charter members of the VIM consortium that helped Lotus develop the spec, as were Borland International, IBM, and Wordperfect.

But neither VIM nor any other single messaging API has yet emerged as the standard. Some companies support both VIM and Microsoft's MAPI, and almost all vendors of messaging systems have pledged some degree of support for CMC.

To some extent, the choice of a messaging API will depend on which networking environment an organisation uses. For example, organisations with many Apple Macintoshes or NetWare LANs might opt for Apple or Novell APIs, which are platform-specific. Both of these APIs employ native operating system features, such as director-

How the LAN Messaging APIs Measure Up

APPLICATION PROGRAM INTERFACE	PRIMARY DEVELOPER	CROSS PLATFORM SUPPORT	ADDRESS BOOK	AVAILABILITY
Common Mail Calls (CMC)	X.400 Application Programming Interface Association	Yes	No	In proposal stage
Messaging Application Interface (MAPI)	Microsoft	Yes[†]	Yes	Simple MAPI, now; Extended MAPI soon
Open Collaboration Environment (OCE)	Apple Computer	No	Yes	Soon
Standard Message Format	Novell	No	Yes	Now
Vendor-Independent Messaging (VIM)	Lotus with help from Apple, Borland International, IBM, Novell and WordPerfect	Yes	Yes	Now

[†] Simple MAPI only; Extended MAPI supports programs running under Windows

ies of users, to provide messaging services. Users with a mixed networking environment might opt for VIM, MAPI, or CMC, which are platform-independent.

VIM uses a store-and-forward method of application-to-application data exchange. It defines the information being exchanged as an object, which can take many forms — text, spreadsheets, image files, voice, digital video, or a combination of these forms.

Objects are exchanged using what the VIM API calls message containers. Messages can be delivered to one or more message containers associated with an application, such as a spreadsheet program or a database management system.

Developers access VIM services by making a call to a standard routine. For two of the most basic services — sending documents and messages — VIM includes two simple calls that jointly comprise the Simple Messaging Interface (SMI). The first call, SMISENDDOCUMENTS, allows documents such as spreadsheets or word processing files to be sent from within an application. The second call, SMISENDMAIL, allows messages to be sent from within an application. Developers looking to provide rudimentary file and message-transfer capabilities would only need to write calls to these two routines from within their applications.

VIM's other services — such as its address book, message composition, and message reading capabilities — can be tapped by making calls to other VIM routines from within an application.

VIM's biggest challenger is Microsoft's MAPI. Like VIM, MAPI is platform and transport-independent; the only requirement is that the attached mail system use store-and-forward methods, like message transfer agents (MTAs). (See 'Misconceptions, Messaging, Mail and APIs,' *Australian Communications* October 1992, for a comparison of MAPI and VIM.)

MAPI comes in two flavours: Simple MAPI supports DOS, OS/2, Windows, and Macintosh environments; while Extended

MAPI supplies Windows-specific services. Simple MAPI is already available in products such as Microsoft Mail.

Like VIM, Simple MAPI includes routines to send mail and documents from within an application. It also enables functions such as logging on and off a mail system, moving through attachments, and selecting which attachments to save. These functions can be performed across OS/2, DOS, Windows and Macs; the only requirement is that the applications use MAPI.

Controlling the Link

The battle between VIM and MAPI has been heated. VIM has attempted to position itself as the universal messaging API, and even Novell and Apple have written software that translates calls from their messaging APIs into VIM APIs. Such links are useful because they allow developers to take advantage of the strengths of multiple APIs for messaging. For instance, a developer can use VIM to link two disparate messaging systems and then tap SMF or OCE — which both use the directory services of their native environments — to deliver the message.

The VIM consortium invited Microsoft to provide a similar link between MAPI and VIM, but Microsoft opted not to. That led Jim Manzi, Lotus' Chairman and CEO, to blast Microsoft and announce that Lotus would write the code linking the two APIs. Manzi's pledge, if followed through, could make VIM the most versatile messaging API, since it would furnish access not only to its own services but also to those of all other messaging APIs.

But being the most versatile API does not mean VIM will be the most widely used. Companies with large investments in Novell NetWare already use Novell's Message-Handling Service, which employs SMF, to exchange messages. MHS users are not likely to abandon their mail systems just for the sake of being VIM-enabled. Similarly, Mac users will most likely use OCE, which is wed to the System 7 operating system.

And VIM faces a challenge from another source: XAPIA, a standards-setting organisation that has published an interface specification for X.400 systems. (Lotus, Microsoft and Novell are all members of XAPIA.)

XAPIA is working to complete Common Mail Calls, which will provide a limited set of functions such as a 'simple send' for mail systems. Additionally, the XAPIA specifications do not yet support directory services.

Because the field is so new, users haven't yet settled on any one group's API offerings. A VIM developers' tool kit shipped in September; Microsoft has shipped only part of MAPI; and the XAPIA's CMC is still being defined. Moreover, Apple and Novell are working to improve their APIs.
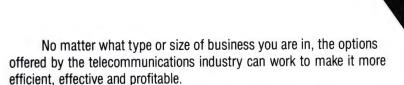
Tapping Native Services

As noted, the messaging APIs from Apple and Novell tap the utilities provided by their respective operating systems, such as directory services. Apple's System 7 already supplies communications among applications, enabling networked Macintosh programs to share files and documents. However, this can only be done when programs are open and the exchange can only take place in real time. OCE takes this concept a step further with its Interprogram Messaging Manager, which provides System 7 with a store-and-forward function that allows communications between programs.

OCE will comprise nine APIs as part of System 7. These APIs include Standard Mail Package (SMP), Standard Directory Package (SDP), and Authentication Manager. SMP and SDP allow users to send a document from any application as an e-mail message. SDP searches for a destination address on a network by tapping System 7's Finder directory lookup feature. Additionally, SMP and SDP will support X.400 and X.500.

Like OCE, Novell's MHS (which is based on its SMF API) taps some of NetWare's functions to simplify messaging. Like VIM and MAPI, users of MHS-compliant applications can send messages without leaving

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those applications. MHS also enables users to send the same message to many users.

Novell recently enhanced SMF to work with its NetWare Global Messaging (NGM) product, which supports four widely used protocols: Novell's SMF, the TCP/IP simple mail transfer protocol, IBM's SNA distribution Services (SNADS), and mail systems built around the X.400 recommendation.

Building the Backbone

Besides settling on an API that links applications and transport mechanisms, net managers also must decide on a messaging infrastructure. In an enterprise network, that means integrating messaging systems running on LANs, minis and mainframes.

Network managers are also facing an explosion in the number of new e-mail users. Between 1990 and 1993, the number of e-mail boxes will have more than doubled, from 16.9 million in 1990 to 35.5 million in 1993, according to International Data Corporation (IDC).

How are network managers tackling the problem of providing a seamless messaging environment for their users? The most common way to integrate such systems is to use X.400 gateways that connect different mail systems to an X.400 backbone or public e-mail service. The first X.400 recommendations defined the basic message-transport process. The message travels from a user agent on a workstation to a message transfer agent (which can reside anywhere in the network). The MTA, in turn, passes the message over the network to other MTAs until it reaches its destination. X.400 acts as a facilitator between different systems' MTAs by acting as a translator.

In 1988, the CCITT enhanced the X.400 spec by allowing messages to be stored until MTAs are ready to receive them. Another enhancement in the 1988 spec enables documents to contain text and graphics. And the 1988 version supports the universal directory service specified by X.500. X.500 details how to maintain directories of users and filenames that can be queried for destination addresses. These directories are stored on X.400 file servers and maintained by network managers.

Large vendors such as IBM use X.400 as a way to link messaging systems, and other vendors are jumping on the X.400 bandwagon — including some with their own messaging APIs. In September, Microsoft said it would use X.400 as the basis for its Enterprise Message Server, an enterprise-wide mail system that will run under Windows NT. Also in September, Lotus said it would enhance cc:Mail, its LAN-based messaging software, to use X.400 as its transport system. Previous cc:Mail releases used X.25 and proprietary protocols to deliver messages. And Novell supported XAPIA's CMC in addition to MHS and SMF.

Salvatore Salamone

Technology Update

◼ ATM Goes On-Line in Canada

BC Tel Advanced Communications, the second largest telecommunications company in Canada, has flipped the switch on the first generally available asynchronous transfer mode (ATM) services in North America. The Burnaby, British Columbia-based company has two ATM offerings: Premium Videoconferencing Service and LAN Interconnection Service. The videoconferencing service offers users broadcast-quality transmission at 2.5Mbps to 100Mbps, while the LAN interconnect service works at 10 or 16Mbps. Both services are delivered over BC Tel's network of ATM switches, which were developed by MPR Teltech. Although other North American carriers have announced ATM-based services — most notably Sprint and MFS Communications — these offerings are available only to restricted groups of users. BC Tel's videoconferencing service is intended not as a standard business videoconferencing offering, but for customers requiring very high quality video, said a BC Tel spokesman.

◼ UTP Passes Transmission Tests

High quality unshielded twisted pair (UTP) cabling is no more likely to cause electromagnetic radiation than shielded twisted pair (STP), according to AT&T. The world's leading vendor of UTP cabling says data-grade or Category 5 UTP's tightly twisted pairs and media filters cope with radiation just as effectively as STP, which uses metal shielding. To back its assertions, AT&T cites two sets of test results. In the first, an independent lab, UK-based Radio Frequency Investigations, ran 16Mbps Token Ring data over AT&T's Category 5 UTP using IBM hardware. In the second, Hewlett-Packard ran 100Mbps FDDI data using cards from Crescendo Communications. In both cases, the cable met existing US and forthcoming European recommendations on electromagnetic radiation. However, some vendors question the testing methodology. "HP only tested one cable, and that's unrealistic," says Ron Schmidt, Senior Vice President and Chief Technical Officer at SynOptics, and an STP proponent.

◼ Standard Proposed for Global Digital Dial-Up

A group of PTTs has proposed a standard for binding together ISDN B channels to support high bandwidth dial-up services suitable for for videoconferencing and file transfers. The standard, called Q.931W, is likely to form the basis of a service to be launched soon by an unidentified US interexchange carrier, according to UK carrier, Mercury Communications. Mercury is among a group of nine PTTs in the so-called Globand Service Providers Group that developed Q.931W. The spec will be submitted to the CCITT and ETSI. PTTS in Belgium, Denmark, Finland, Hong Kong, the Netherlands, Norway, Portugal, Switzerland, Sweden and the UK plan to upgrade existing networks to comply with Q.931W. The networks are interconnected to support international calls under the service name of Globand.

◼ Novell, Sun to Deliver NetWare on SPARC Systems

Not content with dominating the PC LAN business, Novell has reached agreement with Sun Microsystems to deliver native NetWare technology on Sun's SPARCserver systems. The deal marks the first time Novell has set out to develop a native NetWare version for non-Intel architectures. Jan Newman, Executive Vice President of Novell's NetWare Systems Group, says the availability of NetWare on a SPARCserver platform will provide scalability for customers because it offers a wider variety of server options. Sun's product line includes the low-end RISC-based multiprocessor SPARCserver 10 and extends to the recently introduced SPARCcenter 2000 which Sun describes as a 'mainframe capacity Unix server.' The deal marks the first time that Sun will sell its systems without an operating system.

◼ A Forum For Networked Macs

The widespread acceptance of Apple Macintoshes on corporate networks has led to the formation of the AppleTalk Networking Forum (ANF), a group of vendors that includes Apple Computer. The Forum aims to develop improved ways of merging AppleTalk networks with other networking architectures. One of the first areas it will address is encapsulation of AppleTalk traffic for transmission by other networking protocols like TCP/IP. Founding members include Apple, Cisco Systems, Novell, 3Com Corporation and Wellfleet Communications. The Forum's headquarters can be reached on +1 415-966-5055.

◼ Faster Parallel Ports For PCs

A new IEEE standard redefines the parallel port, long a bottleneck in PC performance. The specification, IEEE 1284, defines an Enhanced Parallel Port (EPP) that performs at full duplex rates of 1.5Mbps, or about 50 times faster than existing parallel ports. The standard also defines a signalling format and pin assignments, as well as error detection and resolution specifications. The EPP data rate is comparable to that of small computer systems interface (SCSI) ports, which require internal adaptor boards. One use of an EPP is for attaching a PC to a LAN without an internal network adaptor card. A user might also attach a CD-ROM player or a tape backup system to a PC through an EPP instead of installing a SCSI card.

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Protocols and Migration

Alan Lloyd

Historically, communications protocols were designed to handle the transmission characteristics of carrier services available at the time. These protocols were based on limited communications architectures and the need to pass 'data' over the telephone network. Multidrop and point-to-point synchronous and asynchronous protocols are the typical communications protocols of this era.

OSI introduced some major new concepts. It provided support for a range of common communication services and introduced application layer functions and protocols with defined character and data interchange types. In total, OSI standards represent a vast tool box for engineering distributed systems. The choice of which parts of this OSI tool box are used within systems are specified using profiles. Some of the more common OSI profiles are internationally agreed standards.

The OSI model can be seen as two distinct parts. Network and communications services are made up of the Transport, Network, Link and Physical layers. Application services comprise the Application, Presentation and Session layers. The distinction between the two parts is fundamental in assessing, comparing and implementing OSI.

The communications component of OSI, the lower four layers, uses a range of communications, networking and transport services and protocols. These protocols determine what quality of data transport is provided to the upper application layer functions. The general characteristics applying to most communications protocols are:

- Connection and disconnection control;
- Facilities selection;
- Identification of the protocol type (e.g. data, control, etc.);
- Flow control;
- Sequencing and acknowledgment;
- Error detection and retransmission control; and
- Addressing mechanisms.

The use of these protocol characteristics is dependent on the types of communications links and the types of equipment attached to those links. Traditionally, asynchronous protocols are point-to-point and have primitive flow control and error recovery. Asynchronous communications was generally used in a star network configuration over PSTN modem links for dumb terminal applications. Bit synchronous protocols (such as HDLC and SDLC) provide flow control, data transparency and error recovery. They are implemented to enhance line control procedures that support X.25 packet networks and multi-drop line operations.

Comparing OSI and non-OSI protocols at the communications level is really a comparison of the differences in networking architecture and the communications services that support such protocols. It is a realistic comparison because the transition to OSI could change the network topology from, say, a star-based, host-centric network to a router-switching/logical mesh network, demanding higher bandwidth. Changing protocols and adding additional functionality will affect the cost of supplying the underlying services and network operation.

An example of network transition would be upgrading a star configuration asynchronous terminal network to an X.25 packet network with attached CCITT PADS (packet assemblers/disassemblers). This will change communications switching requirements, introduce network management functions and introduce a global addressing scheme, such as X.121. The comparison of the protocol on a byte-by-byte basis really has no bearing on the changes in network cost or the ensuing operational and addressing issues.

Looking at the Whole Picture

Many LAN-based nets use the TCP/IP internet protocols. Associated with TCP/IP are the routing, address resolution and management protocols such as RIP, ARP and ICMP. TCP/IP itself uses fixed length addressing. The IP protocol has a four byte address field which represents a network number.

The OSI versions of these protocols are ISO Transport, ISO Connection-Less Network Protocol (CLNP), End System-Intermediate System (ES-IS) and Intermediate System-Intermediate System (IS-IS). CLNP protocols use an address field format which is of variable length so that it can accommodate OSI addressing schemes.

Comparisons between TCP/IP and ISO Transport/CLNP are usually quite static. In general terms, these protocols are similar in that they both route packets, have some embedded management and provide a transport service. However, examining the addressing schemes reveals major differences.

With TCP/IP, the network has a choice of deciding how it can share a limited four byte addressing scheme which is unstructured with respect to country, state, etc. In practice, some networks using this scheme will end up with the same addressing number as other networks. There is no problem — so long as those networks remain unconnected.

The OSI addressing scheme is provided within a 20-byte address field and is globally specified, structured and administered by standards bodies or carriers. Duplicate allocation of address space for different network users is highly unlikely.

Post offices make a good metaphor. One uses a limited numbering scheme, the other a global addressing form. In the first, a list of numbers is used to identify the originator and recipient of a message. This list is consulted for every message to get the full address of the recipient. Invalid messages also have to be referenced to find their source address. Because the size of the address number is finite, the number of originators/recipients using the postal service is also finite. And, as there is no explicit concept of geographic address or office hierarchy, such as country or state, all post offices have to be updated concurrently as the list is changed.

The second post office uses the structured global address form. It can make decisions at various levels about the recipient and route the message on the country field, country and state fields, etc. This postal service (and its sorting offices) is based on the hierarchy of the addressing scheme used by the messages it delivers. In this case only

the post office that had updates would have to record them. A new person being added to Melbourne would only cause an update to the Melbourne list.

In the analogy, the difference in address field format and address structure reflects considerable differences in the structural, operational and distribution characteristics of the organisations. So, comparing the control and transmission characteristics of protocols without comparing the signalling and addressing schemes is of little benefit. One must also look at the implications of protocol addressing, network operation and data distribution when selecting protocols.

Comparing SNMP and CMIP

There are many standardised OSI application layer services providing a wide range of facilities. Comparisons are often made between these and de facto or proprietary systems. Within the mail area, for instance, proprietary e-mail interfaces are compared with X.400 messaging. OSI application layer services which utilise their underlying protocols form the basis for globally distributed systems. Because of the wider scope of their functionality and the way in which OSI and CCITT standards have been formulated, comparing them on a static basis is more misleading than statically comparing protocols at the communications level.

For example, in network management, the Simple Network Management Protocol (SNMP) and OSI Common Management Information Protocol (CMIP) are compared because they are considered similar. From a broader perspective, there are major differences. A cursory comparison would reveal that both have 'Get' services which are used to retrieve information from the network elements. The information in the network elements is referred to as managed objects. The fact that both protocols define a Get is the beginning and the end of the comparison.

SNMP and CMIP differ in the network and object addressing information used to communicate across the network and access the network object. The structure and definition of the managed object in the two environments is different, and at a higher level, SNMP is directed at network management, whereas OSI management is directed at system management.

In SNMP there is a fixed manager and agent role, the network device being the agent. In CMIP the manager and agent roles are 'for the instance of communication.' Therefore a network device is in fact permitted to do Gets and Actions on the management platform. This 'slight' difference in specification means that network equipment can be more sophisticated, more autonomous and more interactive within the OSI environment. Because of the flexibility in the semantics of the CMIP protocol, the design of an OSI distributed management system can be far superior to SNMP with respect

Figure 1: Layered System Architecture

Business Applications e.g. Finance, Human Resources, MIS, Order processing, etc.

User Applications and Interfaces e.g. WP, Mail, Spreadsheet, Host Access, GUIs

System Architecture e.g. Hosts, Servers, PCs, Databases, Spoolers & Management

Application Infrastructure e.g. OSI Message and Directory systems, APIs, Transport

Network Model and Services e.g. Star, Mesh, TCP/IP, routers, ISO CLNP & Tpt, X.25

Communications Technology e.g. ISDN, DDN, PSTN, Microwave, Bandwidth Management

to the capability of the management platform and networking equipment.

A knowledgeable comparison between SNMP and CMIP shows the following:
a) The operations (like Gets) are similar, but CMIP has additional types;
b) The naming and addressing for the network and managed objects within the network equipment is totally different;
c) Managed objects are defined in a different way;
d) The management functionality is different — CMIP is far richer;
e) The behaviour of the management services that are supported is quite different. For instance, CMIP permits multiple replies to an operation by selection of multiple objects and also supports bi-directional interaction; and
f) The data syntax used to transfer management information is different.

If the functions and the naming addressing are different, the information model and the distribution model of the system also differ. Having a common Get operation is really of little consequence. An analogy might be two Ford Falcons representing the Get operations. One holds a group of armed bank robbers, the other a group of priests. The car is the same but the values, motives, behaviour and consequences of actions performed by the occupants are quite different!

A Layered Approach

Because OSI impacts on the architecture of systems and networks, and therefore their operational costs, implementing OSI or migrating from de facto or proprietary worlds requires a little more thought in the system design than just protocol comparisons. However, the OSI design is accepted globally and hence is, to some degree, future proof. To plan and perform a systematic approach to the migration process, some concept of system architecture is needed.

The business aspects of an organisation are the prime inputs in defining a migration

strategy and technology plan. The approach to implementation of any business IT system should also follow such layering. Therefore the system architecture should be modelled in parallel with the layered business model. Figure 1 shows the layering of business requirements on to the available technologies and their hierarchy.

At the Business Level, the applications are those essential to the business. Migration at this level is a long term issue and usually addressed tactically by gatewaying the applications on to newer transport technologies. These locked-in applications are usually related to transaction processing, terminal access and central database management systems. These applications will require some form of strategy for the longer term. Will they be surrounded by gateway devices and isolated, upgraded to a suite of OSI interfaces at some level or completely replaced/rewritten? The business level investment in these applications really is the determining factor here. Decisions made at this level will dictate the effort, policies and costs attributed to the underlying levels.

User Level Applications and Interfaces are the facilities provided to the user. Traditionally these would be user interfaces provided by the business level, host-bound applications as defined above. With the move toward client/server architectures, PC and Windows-based productivity tools can be introduced without any direct consideration of the host application interface, other than that the different user interfaces must coexist. The change to distributed processing lends itself to integrating OSI application technologies as well as the standard PC-based packages that are readily available. Therefore, the migration strategy at this level should group and target: Client/server architectures and end system clustering of PCs and servers; terminal to host access and remote functions; user functions such as word processing and mail; file servers and user interfaces.

System Level Architecture is directed at the way in which the host systems and the distributed clusters of client/servers interoperate. Although users may be using office automation applications and gaining host terminal access via the server, there is a need to determine what other functions and interactions are required. For example, there may be interactions between the PC applications and the host, the server and the host and between servers themselves. This level of the migration process should identify the following functions and requirements:
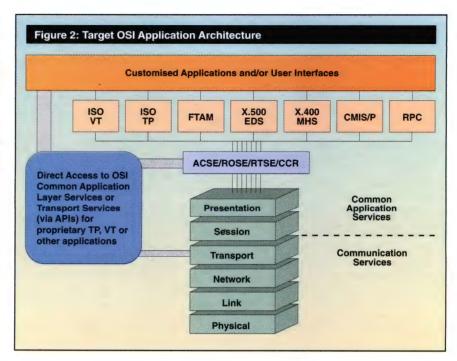
- Client/server host access;
- Print spoolers;
- Distributed databases;
- X.400 messaging functions;
- X.500 directories and name servers (including mail support);
- FTAM file servers;
- Terminal functions;
- Network and systems management;
- Gateway functions; and
- Naming and addressing.

The Application Layer Infrastructure is directed at the way in which software is architectured within a system. As not all applications will migrate to OSI, a number of options should be considered. Taking a TCP/IP network as the basic transport, a first stage could be to run all application traffic as embedded within TCP/ IP (e.g. SNA 3270 over TCP/IP). Migration to ISO CLNP and Transport can occur as software is made available for the network equipment and end systems.

Applications can migrate to OSI in three ways. They can migrate from TCP/IP to ISO CLNP and Transport services only. They can migrate to OSI using the common application layer services of OSI such as Remote Operations (ROSE) and Association Control (ACSE). They can also migrate using the APIs of OSI application layer services such as X.400 MHS or FTAM, Transaction Processing, Remote Procedure Calls or Virtual Terminal depending on the application type.

The second option is probably useful in achieving a consistent architecture, but it will depend on the availability of the tools and the ability to modify the application itself. It may be a viable option for those applications related to TP, VT and remote database access. But new applications should be developed with this application architecture in mind. Figure 2 identifies this OSI application architecture and shows optional paths for more entrenched and historical applications, the common services and the full use of OSI distributed application infrastructure.

The best way to approach the application architecture issue is to identify if your applications are message-based, file-based, transaction-based or terminal-based. Then determine what OSI infrastructure products are available with industry recognised APIs. Finally, take the applications with the least business risk and migrate them to the OSI infrastructure. Once some level of under-

Figure 2: Target OSI Application Architecture

standing and confidence is achieved in this process, continue the process with the transaction and terminal based applications. For those applications that, due to cost, structure or performance do not fit the OSI high level support, the use of the OSI Transport or ACSE/ROSE services could be possible.

The purpose of this overall process is to, at the very least, get the naming and addressing issue consistent at the Network and Transport layer. It is better to aim at consistency at the ACSE/ROSE level as a compromise or fully through to the OSI application services as an ideal. Finally, consider the issues of management and name servers. During the system migration process determine what management interfaces are needed for the applications and how control and status statistics are reflected back to the overall management system.

Network Level services and protocols may be proprietary today but they should migrate to TCP/IP and for a number of applications progress to ISO CLNP and Transport. The issues at this level are: The communications services available to support the migration process, the network topology, routing, switching and bridging functions, network performance, security, costs and management, end system/intermediate system interaction (routing and route management), communication service selection and circuit management, addressing and how applications migrate to the network services.

The Communications Level accommodates the wire and carrier services which could be ISDN and/or leased line (DDN), X.25, Fastpac, etc. These services are used on the basis of cost, bandwidth, distribution and flexibility. Unless there is a change in these, the migration process may not affect this level. Moving from system with a

host/terminal environment to a distributed messaging/file environment usually means that the network traffic is burstier and of greater duration, thus bandwidth upgrades and bandwidth management are necessary. What should be reviewed is the way in which dissimilar services can share or be overlaid on the communications services. ISDN lends itself to bandwidth management, permanent circuits, multiplexed fax, voice and data. The data is, in this case, the 'network level' protocols.

What is important about this layered model is that timing and costs can be applied to the levels of migration and technology evolution. Dependencies can be seen and the impact on business minimised. Taking the 'flat' shotgun approach — comparing protocols and fitting some OSI functionality — can be risky and full OSI integration may be compromised.

Although OSI is seen as complex, keep in mind its goal of producing international standards for globally distributed information systems. Achieving these goals is not an overnight event. The OSI migration process must accommodate downsizing, distributed networks and need for information and system management, which adds to the complexities of dealing with IT. Technology must support the business needs and businesses must be supported by cost effective, internationally recognised and internationally connected information infrastructures.

In assessing OSI, static comparisons made between protocols is the easiest but the most misguided part. The whole open systems process in the longer term should be seen as the standardisation of IT and the IT industry. For major IT systems and corporate networks, there is no alternative.

Alan Lloyd

LAN VIEWS

Bridges, Routers and Broadcasts

Graeme Le Roux

I was recently asked to review a company's plan for expanding its network. It turned out that there was something of a debate in progress as to whether or not the deployment of several bridges or routers would be cost effective. As with most such questions the answer depends upon the nature of your network traffic, the layout of your network and an understanding of the difference between a bridge and a router.

A bridge is a MAC layer device and as such is necessarily protocol independent, rather like a repeater. Where it differs from a repeater is that it makes decisions based on the MAC layer destination address in the headers of all packets which it receives. Most high-end bridges can also make decisions based on programmable bit masks. Bit masks aside, such decisions are very simple. When a packet arrives on one of its ports a bridge stores the source address of the incoming packet in a table along with the number of the port on which it was received and some form of time stamp. If the table, which is kept in memory, is full then the oldest entry is overwritten. The bridge checks this table against the MAC layer destination address of the incoming packet. If the address exists in the table then the packet is *forwarded* only to the port on which that address exists. If it does not exist, the packet is forwarded to all ports except that on which it was received. This means that at worst only the first packet of any transmission is passed all over the network. This conserves bandwidth, particularly in broadcast environments like Ethernet, by eliminating superfluous traffic from network segments.

There are two things which can negate the benefits of a bridge. The first is obvious: If all or most of the traffic is destined for a single segment then as traffic increases the bandwidth available to that segment limits the rest of the system. For example, if you have an Ethernet LAN and put all your servers on one segment, all traffic is between workstations on all segments and the segment upon which the servers are situated. Your bridges are largely acting as expensive repeaters. The second problem, that bridges must forward all broadcast traffic to all ports, is not so obvious.

At some time or other a network node will need to communicate with another node whose address is unknown. To establish that address it transmits a *broadcast* packet. This is a packet whose destination address is a unique value specifically reserved for the purpose. This address is referred to as a *broadcast address*. The rest of the packet is specifically formatted to be recognised by a node which can respond with the address required.

One common example of this is the boot process of a diskless PC. When you turn the machine on it transmits a broadcast packet which is recognised by some server running a boot service. This machine then responds by downloading the kernel code required to boot your PC. The packets which the server transmits contain its address. The diskless PC retrieves and records this from the first packet it receives. A similar sequence of events takes place when you use a shared resource on a server for the first time. You refer to the server by a convenient semi-English name; your workstation needs a network address. This is not necessarily a MAC layer address. In order to get an address your workstation software has two choices. It can either broadcast the name you gave it or it can query

"There are two things which can negate the benefits of a bridge."

some form of *name server* (often called a Domain Name Server) which holds a database of names and addresses. This latter method is considerably more flexible and reduces the number of broadcasts made since workstations can record the name server's address the first time they use it.

Now if you think about it, you will find that neither of the situations I've discussed above is likely to result in a significant amount of broadcast traffic in the normal course of events. The problem is that many NOSs intended for use in a PC environment make heavy use of broadcast traffic. PC NOSs have been designed to make minimal use of workstation memory and CPU resources. As a result, vendors have turned to broadcast mechanisms for many basic network functions. One example is signalling a node's presence on the network. In some NOSs every station on the network broadcasts its NetBIOS name every minute or so. Even in a large LAN this traffic won't have much of an effect on, say an Ethernet or Token Ring segment, but it can effect a low bandwidth bridge. A good purpose-built bridge will forward around 10,000 packets per second (pps) depending upon packet size, but a low bandwidth software bridge running on a server or a PC may forward as few as 1,000 packets per second, or about 60,000 per minute. If each PC on a LAN is broadcasting once per minute you will lose at least 1% of the available throughput of your bridge for every 100 PCs on your LAN. Unfortunately the figures look even worse on a WAN link.

Consider two Ethernets connected via purpose-built bridges and a 64Kbps line with all PCs broadcasting one 64-byte packet per minute. The Ethernets can handle more than 19,000 such packets per second, no problem there. The bridges, assuming a forwarding rate of 10,000 pps, shouldn't have too much trouble either given any likely number of PCs. The leased line is a different story. With a bandwidth of 64Kbps, or about 8,000 bytes/second, it will handle about 7,500 of our 64-byte packets per minute. In other words, just 75 PCs on both Ethernets will consume 1% of your expensive leased line's bandwidth. The only ways to reduce this percentage are to buy more bandwidth, set your bridges to filter broadcasts, or to use a router.

Routers are protocol dependant, network layer devices which do not forward broadcast traffic. They also make complex decisions regarding the 'best' path via which to forward a packet. These decisions are made on the basis of either static or dynamic network information held in memory. They can only be used in conjunction with protocols which have an OSI model network layer which today means mainly the TCP/IP suite, DECnet and IPX/SPX.

In short, the rule of thumb for efficient use of bandwidth, bridges and routers is simple. Manage low bandwidth links — e.g. WAN links — with routers. Contain broadcast traffic with routers. Conserve bandwidth with bridges. Avoid single segment bottlenecks by distributing servers, hosts, etc. Above all analyse your network traffic, crank up your Sniffers, LANalyzers or whatever, and look at what is happening on your network before you start writing cheques for bridges or routers.

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Routers, Prioritisation and Frame Relay

Michael Boland

Over the last six months there has been much press coverage of the origins and operation of the frame relay protocol. However, little has been said about how this important protocol could be applied to solve unique and significant networking problems, particularly problems with routers.

The next major issue to be addressed by router vendors is the provision of deterministic wide area network traffic in private internets. That is, the guarantee that particular types of inter-LAN data traffic will traverse (relatively) slow serial telecommunications lines without impact from all other data movement. What's that I hear you say? 'But many routers can provide datagram priority processing already!' Ah yes, many routers can perform processing and/or buffer priorities to forward datagrams based on particular protocols or user defined filters; however, these current prioritisation schemes cannot provide any guarantee (except for the highest priority traffic), that multiple data streams will traverse telecommunications links at predetermined service levels.

Why is this necessary? Today's private internet users demand much more from their networks. Private internets must not only carry multiple protocol traffic efficiently and quickly, they must now provide a 'level of time' service to network applications and users. In no area is this more evident than in service industries such as the airlines and banking where the network must provide a consistent response time for particular classes of data communications.

It is no longer sufficient that routers categorise network traffic into high, medium and low priority. Network users now demand consistent and reliable time service from any number of user defined data streams. To perform this feat, router vendors are looking very closely at methods of allocating serial line bandwidth based on data priority. They are looking toward *bandwidth reservation*.

> "It is no longer sufficient that routers categorise network traffic into high, medium and low priority."

Bandwidth reservation will allow router administrators explicit control of what fraction of a serial line's bandwidth is reserved for a given protocol or data stream. Unlike time division multiplexing and other statistical schemes, with bandwidth reservation a protocol will be allowed to use more than the reserved capacity if the other protocols are not using the remaining bandwidth. This avoids wastage of valuable serial line capacity while still being able to service those bursty protocols which demand stable bandwidth.

But before you get too excited, there are problems with bandwidth reservation as it will no doubt be implemented by router vendors. There is no universally agreed mechanism to provide bandwidth reservation among vendors. The mechanisms to subdivide serial line bandwidth and the identification mechanism of user data streams will vary from one vendor to the next. The most likely development is that many will implement bandwidth reservation only over their own proprietary serial data link protocols. This raises some serious issues for private internet managers:

- To gain this most useful of features must I be restricted to one router supplier only?
- How can I analyse and debug these proprietary protocols?
- How will bandwidth reservation as implemented by a router vendor affect and be affected by network path failure and network routing protocols such as OSPF and IS-IS?

Many internet users desire the benefits of bandwidth reservation but the prospect of a single router vendor for supply or proprietary extensions leaves them cold. However, there is an alternative which offers the features of bandwidth reservation without router vendor domination or proprietary protocol implementation — frame relay.

Apart from the attributes of low delay and overhead, frame relay's special feature of a committed information rate on virtual circuits offers enhanced WAN bandwidth control. Using frame relay, a serial telecommunications link can be logically subdivided into n number of virtual circuits, where each virtual circuit, in a private internet, represents a logical data path between two remote routers. Using the committed information rate feature, a network manager can make an effective bandwidth allocation for all virtual circuits on the serial line. Routers are allowed to burst beyond their allocated committed information rate for any virtual circuit. Frame relay switch equipment will enable bursts provided spare bandwidth is available from other idle virtual circuits on the same trunk.

So far so good. We let frame relay offer the dynamic bandwidth allocation with guaranteed transfer rates for virtual circuits when link congestion occurs. But how do we identify data streams and allocate them to particular frame relay virtual circuits? This is the router's responsibility. To provide the functionality we seek, internet routers must be able to identify user-defined data streams and forward these across particular frame relay virtual circuits. How the router provides data stream identification is crucial to the flexibility of this system. However, the particular mechanism which a router vendor selects is largely irrelevant, providing that two communicating routers can uniquely identify and forward the same data stream. The advantages of the above system are many:

- Data stream prioritisation can be achieved without being restricted to one router supplier only;
- Standard frame relay protocol support enables off-the-shelf access to link debugging/analysis equipment; and
- Bandwidth reservation implemented external to the router ensures transparency to higher layer network routing protocols and continuity of data stream prioritisation during link failures.

So where do we stand today? While router vendors have firmly embraced frame relay, few have enhanced their protocol filtering and duplicate path handling mechanisms to enable us to use it for effective data stream prioritisation. I view this as a major weakness and an opportunity for them to enhance their products beyond the limited functionality of proprietary bandwidth reservation systems.

User demand for deterministic WAN traffic in internets will increase dramatically, particularly with the influx of traditional IBM users and emerging transaction processing server applications into the LAN internet environment. Expect to hear a lot about bandwidth reservation from the router vendors in the near future. Understand your options and the limitations, and keep an open mind.

Formerly National Technical Services Manager for Network Solutions Australia, Michael Boland specialises in the design and implementation of data communications networks founded on local area network technologies.

Tom Amos

Zoned Out

It seems almost mandatory these days that timed local calls make a cameo appearance during Australian election campaigns, basking in the limelight for a few days only to again fade away into folklore once the fracas has passed. As it was in 1993, or was that 1983, this reliable old chestnut again provided a couple of days' good copy for the media.

But timed local calls are only one mechanism to recover the cost of providing the local Customer Access Network (CAN). All telephone calls have a cost structure related to distance, bandwidth, and the duration of the call. If political expediency dictates that the marketing of telecommunications services is restricted in relation to one of these factors, variations on the other two are still possible.

Timed calls are not merely a modern phenomena. Telecommunications providers have always sought ways to recover the maximum toll from the user, whether it be for a voice, data or image service. This fiscal recovery has little to do with the cost of provision of the service — it's more to do with perceptions of what the market will bear. Timed calls are simply another way of extracting a buck in a potentially fairer way, matching exactly the revenue needed to provide the service plus a small margin. Or so the theory goes!

But community perception is quite different. The hip pocket nerve is totally exposed at even the merest suggestion of anything affecting the rights of telecommunications users.

Consumers of retail telecommunications seem to have a view that they are exploiters of the system, and that this is their right. They feel that telecommunications always has been and always will be a public infrastructure which, like bus shelters and McDonalds' serviettes, is there for the taking. They believe they have the right to make untimed local calls across wide community areas with unlimited holding times, with the needy rightly taking the cross-subsidisation in the form of community telephone contact. But the cost of such excess in the CAN is distributed, via higher average access fees and unit call fees, among everyone who has to pay for an access to the PSTN. (Although if you regularly make a 2-hour call for a unit fee then the flagfall [access fee] would probably seem almost irrelevant.)

The backlash of course, particularly at the consumer household end of the equation (where the voters are) is immediate. Everyone has at least one friend or relative they feel is always on the telephone. The telephone is the social instrument par excellence, and in Australia at least, its unlimited use is enshrined and should remain that way, according to the majority who vote each time the subject is brought up.

In the business world, where the carrier already charges a premium for an identical telephone line (that returns more money per annum in call revenue and looks and sounds just like the home variety), the acceptance of cost-related pricing and usage-based charges is even less likely.

Australian business has always been a sucker for a bad telephone deal, from the day it agreed to pay a premium for a basic telephone over the rest of the community. Most new services for business have been carefully introduced outside the basic PSTN service on a timed basis. Services like cellular, ISDN and premium facsimile are all charged by time. The only business argument about timing concerns the length of the time pulses and the granularity loss that results. The carrier naturally likes to have long pulse intervals for charging purposes, as they charge in advance for each time period and gain the unused seconds, while the business user wants as small a pulse interval as possible to accurately reflect usage.

The timing of local calls is a highly emotive issue. Losses (perceived or otherwise) will mean that neither carrier will be able to even contemplate a form of basic service that is timed, even if it could be demonstrated that most would be better off.

The way forward for the carriers, then, is not to implement the user-pays principle via telephone usage time, but to simply vary the area over which such a call can be made. Bandwidth and distance are the only two variables that can be easily altered. There has been no undertaking by either political party that they will not change the call zone boundaries — far from it, in fact. Charging zone boundaries are effectively determined by the carrier, and if overseas experience is any guide, small single exchange zones will become the untimed call fee areas, and interchange calls will eventually be timed.

It is both conceivable and practical for a zone-based charging system to be overlaid onto the existing arrangements, offering local community area costs and unit fees for each call. Under this system the actual annual cost of using a telephone would be reduced for the average consumer. It would mean the number of digits dialled could, on average, increase, but with the carrier-inspired number changes now going ahead, this tedium would be small. A call across town could be untimed but have a higher access fee and unit fee, or, alternatively, be a community call with the inter-exchange component on a time and distance basis, but with a lower per annum user access fee and a lower unit fee per call set up. The charging system preferred could be nominated by the consumer.

A regime of free local exchange calls could very well work in this type of scenario, giving new meaning to the concept of 'family and friends.' And not a timed call in sight! The choice of low access fee against a rebated untimed access system would be, of course, another interesting debate, but I would be prepared to bet that the final analysis would show that most household users would be better off. And the carriers? Well, they are moving, under Austel auspices, towards cost-related pricing, a cost allocation manual and a chart of accounts that will eventually lead to cost-related CAN pricing anyway. It would sure kill the issue of timed calls stone dead! In the meantime, watch out for new charging zones, one simple alternative to the timed local call.

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Alf Forster

Privatisation Promises

As the dust settles on the election campaign, in which the sale of Telecom emerged as a major issue, claim and counter-claim has left few with a clearer idea of how much the carrier is really worth. Nor did the politicking shed much light on the difficulties and costs involved in actually raising the money as revealed by privatisations in New Zealand, the UK and Japan.

During the campaign Dr Hewson described the Coalition's $20 billion price tag as a conservative mid-range estimate between J.B. Were's $30 billion price and the $12 billion nominated by Goldman Sachs and Salomon Bros. It was a curious comment given that neither the Salomon Bros or J.B. Were estimates existed when the $20 billion price was written into *Fightback! II*. The brief J.B. Were assessment which Dr Hewson clung to found that by applying an earnings before interest and tax valuation, Telecom had an aggregate value of between $18.7 billion and $23 billion. Given that these figures include both debt and equity, the net value of Telecom equity, when $8 billion in debt is subtracted, is in the range of $11 to $15.6 billion. The $30 billion estimate, which also includes debt, comes from applying the New Zealand experience to Telecom's value.

But international comparisons can be utterly misleading. Telecom Australia, even after the merger with OTC, has a far higher debt to equity ratio than either Telecom New Zealand or British Telecom (BT), the two privatised carriers with which it is often compared. Nor does Telecom Australia operate in the favourable regulatory environments enjoyed by British Telecom and Telecom NZ. In the UK, price cap regulation is far less stringent and the interconnect arrangement with Mercury offers far less ready access to customers. In NZ, there are no specific regulations constraining Telecom NZ's competitive response to the entry of Clear Communications.

To a very large extent, BT is a de facto monopoly, whilst Telecom NZ dictates the rules of the competitive game. Telecom Australia has no such freedom or privileges and consequently its value must be far lower than that of other carriers. This critical factor was considered in some length by Goldman Sachs and Salomon Bros. Goldman Sachs carefully factored the loss of market share into its valuation of Telecom and Salomon's found that substantial value could be returned to Telecom by changing the regulatory regime.

Salomon's believed that the emergence of commercially derived interconnection fees and a liberalised price cap could add between $2.1 and $2.4 billion to Telecom's price. This was one of three so-called 'valuation enhancement factors' that Salomon's identified. Although there could be no argument that changed regulatory rules would put massive value back into Telecom, Salomon's other 'valuation enhancement factors' could not be realised. Unlike Goldman Sachs, Salomon's did not have inside access to Telecom information and built its valuation on an estimate of 82,000 employees rather than the 70,000 which Telecom now has. The fact that staff numbers are lower than Salomon's believed means that the supposed efficiency gains which it believed would come from massive job cuts cannot be achieved. This means Salomon's price for Telecom remains close to that identified by Goldman Sachs. And when debt is taken out of J.B. Were's estimates they fall into line with those of the other two banks to give an expected value of close to $12 billion for the national carrier. In summary, there never was a $30 billion estimate.

Estimating a price is one thing but getting that price can prove to be quite another. Like some latter day alchemists the Coalition promises that the sale will turn public sector lead into private sector gold. It promises greater efficiency, greater accountability and employee share ownership that will make workers as one with the boss. But what privateers won't admit is that managing huge floats is difficult and expensive, and that no matter how attractive the shares on offer, the float will be marked by massive commissions, discounts and giveaways to lure purchasers. The costs involved in the initial BT float were found to be $400 million.

Heavy promotion costs and delays will always be experienced unless a trade sale takes place where the whole company is disposed of to a foreign purchaser willing to pay a premium to win a complete or controlling interest. This happened in New Zealand, where the rhetoric of a public offering of Telecom NZ shares which was expected to raise $NZ3 billion was overtaken by the offer of $NZ4 billion from Ameritech and Bell Atlantic for a 90% stake. The two Baby Bells are required to sell down their holding to 24.9% each this year, although this could be extended to mid-1994. In an attempt to guarantee the success of the forthcoming float, Telecom NZ recently announced major cost cutting initiatives that will see more than 25% of staff retrenched. This is in spite of Telecom NZ's record profits.

British Telecom, of which the UK government now holds less than 25%, has been privatised in two tranches. The first tranche, issued in 1984 on a partly paid basis when 50% was sold, was marked by heavy discounting. The dismal service performance of British Telecom and the saturation of the market with such big offerings as British Gas, delayed any further floats until another 25% was offered in 1991, when investors were asked to pay 100 pence on shares worth 350 pence with two further installments to be paid by mid-1993. It's worth noting that the much hoped for small investor interest failed to materialise.

In Japan, a 25% offering of NTT in 1987 was rapidly taken up at a considerable premium by Japanese investors. But the float predated the impact of competition and the rapid erosion of NTT's market share, and the subsequent fall in share price has meant the government cannot put more NTT stock on the market.

The Japanese experience in particular highlights the obvious tensions that exist between privatisation at the maximum price and competition. Despite the obvious contradiction between the two policy goals, the Coalition pretend no such tensions exist. It demonstrates a flagrant disregard for reality and a total lack of care about Australia's single largest and most important strategic asset.

Alf Forster is the National President of the Communications Workers' Union.

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The Network Termination Point: Wherefore Art Thou?

The Government's policy is that in July the network boundary will move back to the property boundary. As Peter Waters discusses, there is growing opposition to this move.

The network boundary (Network Termination Point) has been in retreat since 1989, providing increasing opportunities for customers, building owners and property developers to use private cabling contractors. The 1989 *Telecommunications Act* limited Telecom's monopoly rights to the first telephone, and permitted Austel-licensed private cablers to install cabling within the customer's premises to hook up additional telephones. The current Act further wound the carriers' exclusive rights back to the first telephone socket or the main distribution frame (MDF).

However, the Government foreshadowed that this was only a temporary solution, and that the network boundary would retract further still to the property boundary.
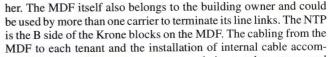
To appreciate the difficulty of the issues surrounding the NTP, it is necessary to get a clear picture of the current situation. The term 'end facility' is defined by section 6 of the *Telecommunications Act* as a telephone socket or an MDF. A 'reserved line link' is a line between distinct places (essentially separate properties) and only general carriers can install line links. The boundary of the carrier's network is defined by section 7 as 'an end facility on a reserved line link if and only if:'

- The end facility is on a property;
- There is a line that is connected to the end facility, which, if it were removed from the end facility, would not itself be or be part of the reserved line link (that is, customer cabling); and
- In the case of a telephone socket, there is no other end facility on the property that proceeds that telephone socket.

For single line residential customers, the carrier will be responsible for the lead-in cabling from the point of entry onto the customer's property through to the first socket inside the house. The carrier also will undertake any necessary trenching (although Telecom allows this to be competitively provided).

For multi-tenanted properties, the carrier provides the lead-in cabling to the MDF. In newer buildings, the conduits appear to be provided by the building owner, and as fixtures to belong to him or her. The MDF itself also belongs to the building owner and could be used by more than one carrier to terminate its line links. The NTP is the B side of the Krone blocks on the MDF. The cabling from the MDF to each tenant and the installation of internal cable accommodation, such as trays and channels, is open to competition, and those cable facilities would belong to the building owner or possibly to the tenant, depending on their lease arrangements.

Customers could decide that customer cabling currently connected to one carrier's network should be connected instead to the other carrier's network, obviating the need for the installation of new cabling by that carrier.

However, while the carrier's network might terminate in the basement of the building, the carrier's service obligations may extend right to the tenant's CPE.

The Explanatory Memorandum makes it clear that the NTP is a facilities and not a services boundary, with the important consequence that 'the fact that a carrier's exclusive rights stop at a NTP is not intended to diminish any obligations a carrier might have beyond that point.' As privately installed cabling is to conform to Austel standards, the carriers are expected to be in a position to provide end-to-end assurances of service quality.

Why the Property Boundary?

While the Act provides for the NTP to be the MDF/first socket, section 11 empowers the Minister to make regulations overriding the statutory provisions to define a different network boundary.

As Austel noted in its discussion paper, 'the concept of the network boundary provides a means of defining and separating the carrier's exclusive rights from those areas where the supply and operation of connected customer equipment and networks is fully competitive.' By further winding back the NTP to the property boundary, the Government's objective was to enhance further customer choice and competition in cabling. The carriers have the right to use their own licensed cabling operation to install customer

cabling beyond the NTP. However, the carriers probably would risk trade practices action if they insisted that customers only use carrier cabling personal or carrier installed customer cabling.

Fixing the NTP at the property boundary follows recent de-regulatory moves in the US. However, stories of the practical difficulties of applying the US policy appear to have reached the Government's ears. The Minister asked Austel to undertake a review of the policy.

A Practical NTP

One of the primary principles identified in Austel's discussion paper for consideration in determining an appropriate NTP was whether the NTP 'is practical to administer and technically feasible.' ATUG agreed that 'the termination point for carrier services should provide a clean and simple interface between a carrier and a customer,' and ATUG considered that moving the NTP to the property boundary dismally failed this test.

The allocation of responsibility for the cost of fault repair and maintenance between the carriers and customers under the carrier licences turns on which side of the NTP the fault is discovered to lie. This clear cut regulatory division in responsibility is largely meaningless unless the NTP has a technical reality. The problem is that to detect faults, a testing device usually has to be inserted at an electrical breakpoint, and the signal tested in segments to the next breakpoint, or to the carrier exchange or back to the CPE. A NTP which is nothing more than a regulatory fiction is, in a very real sense, useless to customers, carriers and private cablers alike.

NTP Options

The Austel discussion identified three separate locations which could serve as the NTP:
- Retain the current status quo of the MDF/first socket;
- Set the NTP at the property boundary; or
- Set the NTP at the building entry point.

The Consumers' Telecommunications Network (CTN) expressed its strong opposition to any alternative to the status quo. CTN noted that: 'Consumers have the confidence that should they experience a fault on the line (that isn't in the handset) then Telecom will be responsible for the repairs . . . While clearly Optus may wish to systematically establish their own customers, providing their own fault reporting and maintenance service, CTN is unconvinced that there are any additional benefits to be gained by adding commercial cablers into the equation.'

While moving the NTP to the property boundary probably holds little benefit for residential customers, multi-line customers could benefit from the enhanced competition in cabling installation and maintenance services. However, to make a property boundary NTP work, the carrier probably would have to pull up the cable in a special pit constructed at the property boundary to create a separate technical breakpoint for testing purposes and to allow customers, if so minded, to install their own cabling to the MDF. ATUG noted that the property boundary exposes the customer's telephone system to serious security problems because it is much easier for parties intent on tapping into the customer's line, or vandalising the customer's telephone system, to do so at an external pit. The AIIA also noted that it would be necessary to provide 'a weather proof 'box' at the property boundary to house the physical NTP device and surge suppression/isolation protection etc . . . This would be costly [to the customer], both to implement and then maintain.'

The AIIA thought that the building entry point represented a reasonable compromise. For single or two line premises, such as residential homes, this would involve installing on the outside of the house an Austel-approved network termination device, which could be supplied, installed and maintained by a private contractor. All internal wiring, including to the first socket, also would be open to competition. The carrier's network would terminate with the lead-in cabling on the carrier side of the externally installed network termination device.

The AIIA noted that its approach: 'Would not allow the user to provide cabling from the Government proposed 'property boundary' NTP position to her building etc . . . The acceptability would be provisional, however, on there being a minimum distance prescribed for the point at which the cost of extending the NTP from [the property] point to the building is negotiable between the carrier and the customer.'

The AIIA proposal would not make much difference for MDF serviced buildings because the Krone blocks terminating the carrier network could not realistically be separated from the MDF, and the MDF is too bulky and sensitive to locate externally.

Active Service Terminations

For many sophisticated, 'active services,' (e.g. ISDN), high-functionality equipment needs to be located near to the customer. NTP issues for 'plain old voice/data' provided over traditional copper wiring are positively straightforward compared to the issues which arise with active service terminations.

Telecom currently regards active service termination equipment (ATSE) as being within the carrier reservation because ATSE is seen as part of the carrier network equipment required to deliver the service to the customer. The active service termination equipment is not regarded as CPE, but rather part of the carrier network 'tromboned' into the customer's premises.

The difficulty under the current regulatory regime is that all equipment beyond the MDF is regarded as CPE and subject both to Austel approval and competitive provision. This would include any ATSE which is situated on leased premises in a building and which is connected to the network through the MDF. This problem currently is avoided by the carrier cabling around the MDF direct to the customer, in which case the NTP would 'revert' to the first telephone socket beyond the ATSE. This approach will not, of course, work if the NTP moved back to the property boundary. Much less than the MDF, ATSE is particularly unsuited to installation externally or in a pit at the property boundary.

ATUG's view was that: 'At present there is very limited competition in the supply of network terminating devices for active services. However, if the full intent of the Government policy is to be achieved and customers are to have the benefits available from increased competition there is a need to have the same freedom of choice for active services in the provision of customer equipment as there is with passive service (PABXs, modems, facsimiles and telephone handsets).'

However, some ATSEs contain proprietary standards of the carriers or of their suppliers. This potentially could cause problems if the ATSE were moved outside the regulatory 'safe haven' of the carriers' network reservations and subjected to Austel Technical Standards like any other CPE. The AIIA suggested that the carriers' own ATSE need not necessarily be subject to Austel approval, but that the carriers should be required either to move to international standards or to publish interface specifications for the carrier-side of the ATSE in order to allow independent development of compatible competing ATSE. Austel has recently announced that digital terminating equipment will not be subject to the CPE standards process, providing a somewhat analogous example.

Conclusion

The Government may have to plead the streaker's defence on the NTP: It seemed like a good idea at the time. The clear message seems to be that the NTP must have a real, tangible point and not merely a regulatory function. Placing the NTP at the property boundary may be costly, inconvenient and confusing to customers and carriers alike.

Peter Waters is a partner with the Sydney technology law firm Gilbert & Tobin, and specialises in telecommunications and information technology contracting and regulation. This column sets out his views and not those of clients of his firm.

Cooperation the Key to Offshore Competitiveness

Klaus Lahr
Chairman and Managing Director, Siemens Ltd

Klaus Lahr sits at the helm of the Siemens Group in Australia and New Zealand, which includes Siemens Plessey and Siemens Nixdorf. He came to Australia in 1988 with 28 years of experience working for Siemens AG of Germany, a leading multinational manufacturer of communications equipment which has a strong base in electronic and electrical technology. He is a qualified telecommunications engineer from Stuttgart University and has trained in Business Administration at Stanford University. He spoke with Liz Fell last month in Melbourne, where Siemens Ltd established its headquarters more than 100 years ago.

H*as carrier competition in Australia offered new opportunities for industry suppliers such as Siemens?*

Lahr: Yes, but life is much rougher and tougher because the carriers are under so much pressure: Their customers want the lowest tariffs, their shareholders want dividends and they must invest in new services. This poses a dilemma for the established Australian suppliers who are now under tremendous commercial pressure from the carriers to deliver equipment at 'world market prices.' To do this, we need a larger home market than Australia. We must export. From the economists' point of view, this price war may reduce the input cost of telecommunications for the economy, but will it win us a role in, let's say, Thailand?

AC: *You have mentioned that there is a price war between the carriers. How do you see this affecting AOTC?*

Lahr: It's now generally accepted worldwide that when you have this deregulated environment, competition starts with long distance and international traffic. It doesn't start with the nice copper local access network.

In Australia, long distance and international tariffs are going down and down, even though Bob Mansfield said there wouldn't be a price war and Frank Blount is saying there is no price war. Next they go to the courts like Optus is doing right now. Look at New Zealand where they have had five or six rulings, then up to the High Court. This is only a delaying factor. Those tariffs will continue to go down and incumbent carriers such as AOTC are sitting on the local network with all those costs. What can they do about this? They can sell it off, but no-one will buy it, or they can lift the local tariffs. This will happen, even though it is very difficult because it's political.

AC: *How do the carriers fit this scenario? Will they prop up the industry suppliers?*

Lahr: The price war between the carriers — AOTC, Optus, Arena — means the pressure on the supply industry will become stronger and stronger. As the war gets tougher, I can see these industry plans getting softer and softer. The carriers will say: 'I will buy from you, a local supplier, as long as you are internationally competitive.' We may try to argue that we are, but we're not.

AC: *And you're not competitive because the domestic market is so small?*

Lahr: The telecommunications market is global, there are no borders, so you need long production runs, economies of scale and big quantities to be in the international game. In Germany, for instance, my company produces between seven and eight million plain old telephones each year and we can hardly compete with the Asian manufacturers. In Australia, the two major producers are supplying between them about one million telephone handsets a year. So there is a problem. I don't see quantum leaps for the Australian supply industry in the future. The real activity, I'm afraid, is around us.

AC: *In the high growth Asian markets such as Indonesia and China?*

Lahr: Yes. Siemens is selling three million lines a year in China. Ericsson and Alcatel are there too.

AC: *For the Australian arm of Siemens to play a major role in the region, what is needed?*

Lahr: This is something I dream about. If Australia really wants to play a role in the region, we must have a strong image in telecommunications.

Will Thailand see AOTC as a leading-edge carrier or will it prefer Deutsche Telekom, France Telecom or whomever has a better image? From our point of view, and I'm sure the whole supply industry would agree, we need a strong Australian carrier.

AC: *You sound as though you would like to return to the days when Australia had a monopoly carrier?*

Lahr: No, we can't return to the halcyon days. But we need the equivalent of a Qantas in telecommunications.

AC: *So the price war in the domestic market could endanger AOTC's international image and regional expansion opportunities?*

Lahr: Yes. I can't understand why the Government is allowing this war. From the point of view of the supply industry, which wants to export, we deplore it.

AC: *I understand that you were hoping to join AOTC in Indonesia last year? What happened to this proposal?*

Lahr: Well, AOTC has done well overseas, but to be a big player in this upcoming deregulated market, you have to take an equity position. If Indonesia or Cambodia wants to enhance its telecommunication network, it wants an Australian package that includes network planning, construction, operation, training and equity. The problem with Indonesia, as far as I understood it, was that OTC at that time was not entitled to take an equity position by the Board. So AOTC needs both the mandate and the finances to become a major player in the region.

AC: *Do you think the mid-1990 export targets proposed by the Labor Government are attainable?*

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Lahr: No. If we use the Australian car industry as an analogy — and John Button has been very outspoken on this — some exports would not have happened without the Government's car plan. In the telecommunications industry, some of my colleagues are exporting because they must fulfill certain Australian IDAs [Industry Development Arrangements].

AC: *So what happens if the current IDA scheme for Customer Premises Equipment is abolished?*

Lahr: Some, not all, but some exports will die. This will not be because of 'bad will,' but because of the global nature of the industry. Siemens, for instance, has some 250 factories around the world, which is far too many. We have to reduce this number to about 30. I wouldn't manufacture a lot of telecommunications equipment in Australia, for instance. I would do something else.

AC: *How does Siemens link in with other company factories in the region?*

Lahr: Let's suppose that suddenly we discover that the PABX market in Australia is interesting, which it is not at present. Then I would draw on expertise in Siemens Bangkok and Siemens Singapore where they have the HiCom 300, a fantastic ISDN PABX. We have never sold that here because the market is saturated.
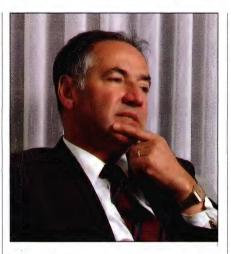
AC: *What happened to the Commander systems that you used to supply to Telecom here?*

Lahr: That was a mistake on our part, and maybe on Telecom's part. Telecom wanted a lot of features in those key systems and we said, 'No, in order to have the economy of scale, we are producing a certain type of key system worldwide and we want to sell that in Australia.' So both points of view didn't really come together. I would play it differently today, although the Australian market for key systems has halved. It's now worth roughly $65-$100 million with about 17 players.

AC: *Would you argue that the local supply industry here is too fragmented to compete in the global market?*

Lahr: Yes, but it's even deeper than that. Does Australia need an electronics industry of which telecommunications is just one part? You could also ask: Is there an OECD country in the world that does not have an electronics industry? Button posed this question recently in relation to the car industry. He believed Australia needed its own industry not so much because the cars are fantastic but because it was necessary to have those skills and the people trained with those skills.

AC: *How important is it for Siemens to provide jobs and skills for Australians?*

Lahr: The Siemens Group has 2,000 employees now, and only eight or 10 come from our parent company. We believe that to be in a country you have to be a good citizen. To be just a sales company, importing and selling here, is not good enough. You have to be in the value-added process and this is not necessarily mass producing articles which are better produced in Thailand, Malaysia or elsewhere. We must provide opportunities for Australian skills in areas such as engineering, software, contracting, installation, operation and the development of applications software. This is something we can do much better here than nailing together electronic equipment with imported parts where the value-added is through soldering and testing. We have good engineers, so we should use this Australian expertise.

> "We must provide opportunities for Australian skills in areas such as engineering, software, contracting, installation, operation and the development of applications software. This is something we can do much better here than 'nailing together' electronic equipment with imported parts where the value-added is through soldering and testing."

AC: *I'm told that at a recent conference, you referred to the local telecoms equipment industry as 'Mickey Mouse'? Did anyone object to that phrase?*

Lahr: Yes, DOTAC was a bit upset!

AC: *But surely it's quite an appropriate phrase?*

Lahr: From a world perspective, we are very, very small. We are actually importing a large number of components and then soldering them together.

AC: *AWA once used the phrase 'colonial work' to refer to our equipment industry.*

Lahr: You must distinguish between the Aussie battlers and the multinationals here. The Aussie battlers such as JNA, QPSX and Jtec are really good companies. We are marketing QPSX and so is Alcatel. If we weren't marketing this, QPSX would be dead.

AC: *Are you saying that QPSX technology receives a branding or respectability when marketed by multinationals such as Siemens or Alcatel?*

Lahr: Yes, it's not marketed under the Australian flag, though it's known on the Siemens side that it comes from Australia. I don't know about Alcatel.

AC: *So offshore customers wouldn't necessarily know that QPSX is an Australian invention?*

Lahr: No. I wanted to show QPSX to some friends at the last Hannover CeBIT, and it was under the Siemens flag. What we have to do, and I'm always doing this when I'm over in Europe and they laugh at me, is advertise all facets of Australia overseas.

AC: *Is it difficult to persuade your parent company in Germany that it is worth investing in Australia?*

Lahr: We started here in 1870, registered in the Colony of Victoria in 1892, survived two world wars and started from scratch twice. So that shows our commitment to Australia. Telecommunications is only one market for Siemens in Australia. We have expertise in complex engineering plants for water and sewage treatment and electrical power generation and distribution. An upcoming market segment is the railways here which are 'stone age.' Their regeneration will involve rolling stock, locomotives, track, power line and train radio, signalling and so on.

AC: *Has Siemens been negotiating to join the Partnership for Development Program?*

Lahr: Yes, we've been negotiating a Partnership agreement across a broad range of our activities, not just telecommunications. DITAC was quite flexible in accepting that, but we missed out on signing it by one week because the election was announced.

AC: *So the Partnership will enable you to exploit synergies in electronic and electrical technology and your export success in areas such as electrical power engineering?*

Lahr: Yes. Being here since 1892, there have been times when our telecommunications side was better than it is now. We put in all those microwave links for Telecom, for instance. There have also been times when the power side was not as good as it is now.

AC: *Do these synergies provide you with a competitive advantage over single industry companies such as Ericsson?*

Lahr: We are broader, so it balances out over time.

AC: *Do you have a mandate from your parent company to export certain services or goods to the Asia Pacific region?*
Lahr: I'm always telling Canberra that this idea of a 'mandate' is very artificial because companies may give a mandate to their subsidiary in Australia for a contract, but if that contract is lost, then the mandate is lost. But it is possible, and we have one world mandate for the Mini Distributor Frame (MDF) which is the interlinkage between the cable network and the switching. That is produced and used here and we're selling that worldwide via our Siemens organisation.

AC: *In terms of revenue, Siemens is reported to be the third largest telecoms equipment manufacturer in the world, yet it has a very low profile here.*
Lahr: Yes, only here.

AC: *Why is this? You appear to be winning plenty of private network contracts on the transmission side, for instance?*
Lahr: Yes, but Ericsson and Alcatel are positioned through AOTC as the main players on the switching side. One of my group companies, Siemens Plessey Electronic Systems, has been quite successful in doing the DISCON and RAVEN telecommunications projects for the Department of Defence, but we are not very outspoken about that.

AC: *You have said that the market share of local suppliers is correlated with AOTC contracts. What areas are you targeting?*
Lahr: I've told Doug Campbell and Frank Blount from AOTC that we want to work in two fields if possible. We want to be in the 'bread and butter' business to make money, and we want to be in a field that secures the future.

AC: *Is the 'bread and butter' business in the transmission field?*
Lahr: Yes.

AC: *What proportion of the transmission market does Siemens have?*
Lahr: I'm ambitious. It's not big enough.

AC: *And do future opportunities involve advanced digital transmission technologies and systems for the broadband network?*
Lahr: Yes, SDH [synchronous digital hierarchy], network management, video codecs and so on.

AC: *In network management, you are working with AOTC on a Transmission Equipment Supervisory and Alarm Management System [TESAMS]. Are there other systems?*
Lahr: Yes, TESAMS and a tender is still cooking for a network management system in the transmission network.

AC: *I presume that in your home market you have a presence in the GSM cellular mobile sector. With three GSM networks starting up here, have you been looking at this market?*
Lahr: Sure.

AC: *What sort of GSM opportunities are you exploring?*
Lahr: Well, GSM handset manufacturing requires an economy of scale, so you must do this in huge quantities because the prices must be very low. I see good opportunities for the sale of GSM terminals here because this is about marketing and sales channels. We have started with GSM handsets in Germany, we have sold our first handset in New Zealand, and we will start up here soon too.

AC: *What about software development and SIM cards for GSM terminals?*
Lahr: Yes, we are working on that.

> *"I haven't asked Bill Page-Hanify from Alcatel about this, but there could even be a case for Alcatel, Siemens and others to tender as a team, with an Australian carrier as the operating partner. And if it is a big contract, the Australian banks and the Minister for Trade should also be asked to support the team. Then we would have an Aussie package which would not be as easy to write off as Alcatel or Siemens tendering on their own."*

AC: *In terms of computing and software capabilities, how does the recently merged Siemens Nixdorf fit in?*
Lahr: Siemens Nixdorf draws together information and telecommunication technologies and touches on areas such as network management. It is doing quite well here in systems integration with customers such as the Commonwealth Bank, Coles Myer and the Department of Social Security.

AC: *Does it offer full network management services?*
Lahr: Not yet in Australia. It is always important to focus on what you do best: It has a different approach, a different market and involves different people. But Siemens Nixdorf has a huge expertise in network management with telecoms worldwide, and we are bringing this know-how to Australia.

AC: *I understand you are doing some exciting R&D work at Monash University on digital video compression and the development of a Universal Video Codec?*

Lahr: Yes, that is one of our research projects which could be of worldwide interest for our company. It could also be of interest here in terms of the delivery of Pay TV. But we have a long way to go before we have a marketable product. You never know whether something is worthwhile until you can sell it. I was rather hesitant to support that because it is more or less basic research and I would prefer something tied to practical life such as the development of applications for ISDN.

AC: *I understand that you expressed interest in buying Telecom Industries from AOTC last year? What happened there?*
Lahr: We lost interest.

AC: *Frank Blount has now said that AOTC will retain this if the unions deliver on work practices.*
Lahr: Yes, when we noticed there was a willingness by the unions to endeavour to improve the work practices I felt that we shouldn't proceed.

AC: *What would you have done with it?*
Lahr: I would have used it as a basis for contracting and installation work for AOTC. We are very interested in this sector.

AC: *You have argued for a need to re-examine the way we divide the industry into equipment and services because traditional roles are changing. Is your parent company planning to enter the operational or service provider side?*
Lahr: This is a dilemma for all big European companies such as Ericsson, Alcatel and Siemens. Should we just develop, manufacture and sell equipment or should we move into the operating side?

Until now, with the exception of AT&T, we have all said: 'Operations are for somebody else, and if we move into that side we could have a conflict of interest.' But the world is changing with all those value added resellers, so we must change. Maybe there is a possibility. It is not quite clear yet.

AC: *Didn't Siemens set up a VAN subsidiary in Germany which folded a couple of years ago?*
Lahr: That was our own network which we tried to open up for other customers, but it didn't work because there was a management problem.

AC: *In your home market, do you expect that Deutsche Telekom will be privatised in the near future?*
Lahr: It could well happen. They need a lot of money to invest in eastern Germany, to modernise and to go overseas. Until now, Deutsche Telekom hasn't been an overseas player. And the German Government needs money so it is talking about privatising the highway system, the railway system and

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Deutsche Telekom. The value of Deutsche Telekom could range between DM150 and DM200 billion.

AC: *Will Germany introduce full network competition?*

Lahr: There is a lot of freeing up already. Will basic voice services be opened up? The lawyers argue that can begin tomorrow, but it is not that easy. Germany, France and Italy, not so much the UK because it has no indigenous manufacturing industry left, but these other countries look at telecommunications as a strategic industry. They recognise that a lot of jobs and working places are tied up with this, so they are being very careful.

AC: *Is France leading the European push against network competition?*

Lahr: France is very opposed to opening up, and I can understand that. Alcatel is the biggest player there, and they want to safeguard their industry. There are two different constituencies: the industry which wants to protect its home market, and the customers in France who would probably welcome lower tariffs.

AC: *As the major German manufacturer, is Siemens lobbying the German Government on this?*

Lahr: To a certain extent only. Siemens is exporting 60% so we would be crazy to oppose GATT, for instance. There should be free exports. But the German Government has always told the German citizens: 'Look, you have to pay a little bit more for your railways and telecommunications because we have to export, and this is the price.' Whether the German citizens will continue to accept this, I have no idea.

AC: *I realise one can't make a direct translation from Germany to Australia, but the tensions appear similar?*

Lahr: Australia is freer because it only has a small telecommunications manufacturing industry. But, yes, it comes together, because there is pressure on industry, not only telecommunications, to produce at the lowest possible cost. This means that parts of the industry are moving from Germany to Malaysia or wherever else there are factories. And it means automation for the factories staying in Germany.

AC: *In Australia, are there too many competing interests for both carriers and suppliers to make a concerted push into Asia?*

Lahr: There are competing interests, but there is also a way out. The window of opportunity in the region will close in the next five to 10 years, because the Malaysian telecoms industry, for example, will be competing here then. So Australian companies must team up and go together to those countries in the region seeking enhancement of their telecommunications networks and services. I haven't asked Bill Page-Hanify from Alcatel about this, but there could even be a case for Alcatel, Siemens and others to tender as a team, with an Australian carrier as the operating partner. And if it is a big contract, the Australian banks and the Minister for Trade should also be asked to support the team. Then we would have an Aussie package which would not be as easy to write off as Alcatel or Siemens tendering on their own. I don't know whether it would work, but we could try it!

AC: *Do you see any signs of this?*

Lahr: No, but you must have a vision. The first step towards achieving this vision is to ensure that Australia has a strong telecommunications carrier, a technology leader in the region.

Liz Fell is a freelance journalist and Senior Research Fellow at the Centre for International Research and Communication and Information Technologies (CIRCIT). She is based in Melbourne, Victoria.

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Optus — Fast Forwarding the Future

Now a little over 12 months old, Optus Communications has moved with astonishing speed and skill to create a network, a culture and an identity. Shelley Spriggs examines the story so far.

O n January 31, 1993, Optus Communications turned one year old. There was no wild revelling among the Optus ranks — in fact, CEO Bob Mansfield reckoned it would have gone uncelebrated had not one of the company's recruitment contractors thrown a smallish, politish affair at Sydney's American Club. You can bet the first birthday of telecommunications' enfant terrible did not pass unnoticed by journalists and commentators.

"We are not only in it for a long time, we are in it for a good time," said Mansfield at the birthday bash. And that about describes the demeanour, generally, of Optus people; and is at the root of the company's constantly talked about 'values.'
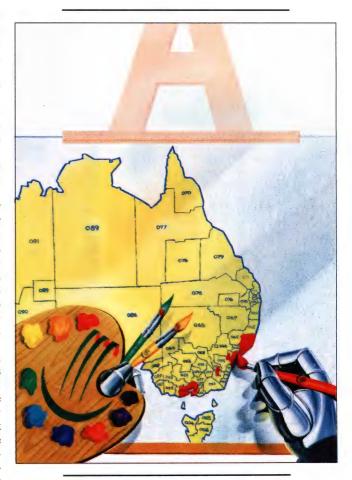
It's all about *additood*. The thinking is simple: Attitude in the people creates attitude in the company, and attitude in the company is the competitive differential — what will make it a winner.

Winning in this case is about achieving the targets Optus set for itself: Rollout targets, market share targets, revenue targets. One year out, the milestones are coming and going pretty well to the development schedule. The few hiccups along the way — if you can call a satellite lost in space, legal action against Telecom's tariffing practices and a 'misinterpretation' of a licence condition hiccups — seem to have barely caused a stir within the organisation. That comes back to attitude: "If there is one thing start-up situations teach you it is that you must bring in people with a high degree of frustration tolerance; people that don't need a proscriptive environment in which to operate," says Human Relations Director, George Webster.

One year out the pervading impression is one of vitality. High times. "We haven't, as an organisation, suffered or tasted defeat. As long as that continues, then the excitement continues," says Webster.

In a sense, Optus' first year is largely testimony to the extent the bid team got it right. From here on in, the influence of the accuracy of the bid team on performance will diminish as the management strategies and attitude factor swing in. The world is watching. There has always been a sense of 'an experiment' with Australia's re-regulated telecommunications environment and its newly licenced second carrier. If Optus gets it right — achieves its own targets and those laid down by the Government in its licence conditions — then both the policy makers and modern management theorists are vindicated.

The company is under fairly constant scrutiny both locally and internationally: The ubiquitous nature of telecommunications in Australia ensures that a new player gets noticed by a fair thwack of Australians — especially when both the Government and Optus have promised that we consumers will be the real winners; and because, as we are frequently being told, the company is operating in the most

liberalised environment in the world, building the most modern network in the world.

Moving Right Along

One year out Optus has 'all but' completed fibre optic cables linking Sydney-Canberra and Sydney-Melbourne and is advanced on the Sydney-Brisbane installation; it has established its head office (in the former Aussat House) and two regional operations centres — the

Optus Centre in North Sydney for the northern region covering Queensland, ACT and NSW, and the Optus Centre in Melbourne for the southern region covering the rest of Australia; it has opened retail offices in most capital cities (with the exception of Darwin and Hobart); has now completed building switches in Sydney and Melbourne and, by publication, will about have built switches in Canberra and Brisbane; it has opened its Sydney Technical Centre, and a $40 million exchange in Melbourne; faced two satellite launch mishaps — one delaying the launch but not the subsequent commercial service of one satellite, the other causing the satellite to be declared a total loss; and has employed about 1,300 people to join the 300 Aussat people already on board.

Its first services — mobile and long distance — were launched on time and quickly attracted users (71,000 users or 13% of the mobile market at February 17, and 352,000 users of the long distance services); a move into the business market was announced in December but is not expected to really get going until mid-1993 after Optus' own cables and and switches are commissioned; and by publication Optus GSM, the next service to be introduced and the first using Optus infrastructure, will be operational.

The total expenditure target for calendar year 1992 was $294 million with a local content component of 50%. Each was within a whisker of being spot on — $10 million short on expenditure and 6% up on local content (i.e. 56%). And as any Optus person

worth their salt is quick to point out, calendar '92 for Optus was 11 months since the Government only awarded the network licence on January 31.

Strategic alliance agreements have been signed with all major suppliers and somewhere in the order of 1,100 (Optus' estimate) jobs have been created in that second tier of suppliers; a landmark agreement for single union coverage was established and the Optus Enterprise Agreement negotiated and settled with little fanfare; and $20 million (of the total $284 million spent during the year) was spent on training, which Optus says is about right for its stated 1997 training expenditure target of $100 million.

Bid Team Bullseye

Matching the activities of the past 12 months against the prescriptions of the bid team, you get an almost unreal feeling that some painting by numbers has been going on. Webster enunciates a prevailing view within the organisation when he says "the bid team has been surprisingly accurate."

But not as surprising as it superficially might appear says Paddy Costanzo, Optus' Manager, Industry Policy. The bid team was made up of BellSouth and Cable & Wireless (C&W) people imported for that phase alone, and some Australians, most of whom remain sprinkled through the organisation. (Terry Winters from the Melbourne-based BellSouth paging operation, was a significant member of the team and he sits on the Optus board.) Says Costanzo: "BellSouth had been looking at competitive situations around the world for some time before getting involved in the Optus bid, C&W had set up Mercury in the UK, and both companies had experience in operating in various regulatory regimes."

Nevertheless, as Webster points out, the team did do a particularly good balancing act. "They took the time to think through the cultural type issues as distinct from simply being preoccupied with network design and rollout commitments etc. There was an appreciation of the sense that we had an opportunity. Not entirely greenfields in that we had 350 Aussat people and that was an entrenched culture. But it was an opportunity to start an organisation without the historical baggage of the past because in essence it wasn't our baggage."

The Optus Way

So important is the attitude and cultural aspects that some applicants for managerial positions sit 'profile assessments' (psyche tests by any other name); and, explains Webster, "for the bulk of the recruitment, which has been the customer service and telemarketing staff, there is a combination of tests, panel interviews and group discussions. In recruitment our starting point is getting people who are attitudinally and culturally right for our type of business. If can-

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Building the Corporate Network

The rollout of the Operational Support System (OSS), Optus' name for its much-vaunted information technology and application systems, is in two Phases. In Phase I, off-the-shelf applications, customised where necessary, are found and brought into operation as fast as possible to match the business requirement. Twenty-five applications have been deployed to date including network monitoring and control, customer care and billing, marketing and financial systems. Phase I runs through mid-1993 and will take in the GSM digital cellular network and business network services on top of the current mobile and long distance services.

Phase II builds on the base of Phase I applications and will, says an Optus document, begin replacing the processes embedded in those Phase I applications with Optus-designed processes running on an open, modular architecture.

Paul Cook, Optus' IT and Operations Manager, sees success in Phase I as a factor of having the OSS operational; and having the OSS operational in time to begin service offerings as a factor of the close working relationship with strategic suppliers. Close means close. The suppliers moved in.

The actual delivery of OSS is through Digital Equipment Corporation. It has established the Optus Prime Contractor Organisation (OPCO) — taking in people from preferred suppliers Computer Sciences of Australia, Computer Power, IBM, Whitesmiths, EDS, Bell Canada International and other IT providers — as a separate entity. So, while there are less than 25 OSS people on the Optus payroll, there are actually hundreds from different suppliers working on specialist areas.

Some of those are located in Optus buildings as if they are surrogate employees — they are in the internal telephone

directory, they are on the e-mail system, they even attend Optus Challenge seminars. The same goes for the suppliers of the desktop devices — Logical Solutions.

Desktop computing is all Apple Macintoshes, and Cook reckons Optus probably has one of the biggest Apple nets in the country. Currently 2,000 have been deployed, networked through Ethernet from the desk. File servers support buildings or obvious work groups like Human Resources or Finance, provide backups and run e-mail. Mail, says Cook, is a way of life at Optus, estimating 99% of all documents are sent around electronically.

Optus' computer operations at its Sydney Technical Centre are managed by Digital; and IBM is the facilities manager for the long distance billing system operating at IBM's Cumberland Forest Centre. The Macs also get into the IBM through 3270 windows, and talk to the VAXes as if they were dumb terminals.

Logical's people will be sited in most Optus buildings. They are in both the Optus Centre and Optus House in Sydney, and the plan is for them to be in the Melbourne centre as well. Says Cook: "Upstairs there is about a dozen of them; it is effectively their retail outlet and they have all the hardware and software there. If we need to order it is done very easily through e-mail and direct contact with Logical."

"There is a nice fuzziness between our key suppliers and Optus. Because they are essential to the Optus success, the strategy is a very high trust relationship."

Cook, seconded from C&W, says it was great to see this novel approach working here because it was something he had been trying to do in the United Kingdom. Without these relationships, he believes Optus could not have delivered long distance services in nine months.

Shelley Spriggs

Who's Who at Optus

		CEO		
		Bob Mansfield		

Chief Financial Officer	Chief Operating Officer	Director Human Resources	General Counsel & Co. Secretary	Director Regulatory & Public Affairs
John Greaves (Australia)	Ian Boatman (Cable & Wireless)	George Webster (Australia)	Rob Simpson (Australia)	Andrew Bailey (Australia)

Director Operational Support System	Director Projects	Director Mobile	Director Network Operations	Director International	Director Business Development	Director Sales & Marketing
Bert Williams (BellSouth)	Dale Register (BellSouth)	Buddy Neel (BellSouth)	Alan Oldfield (Cable & Wireless)	David Lawrence (Cable & Wireless)	Wayne Nowland (Australia: ex Aussat)	Cleve Whatley (BellSouth)

didates satisfy us on that front, then we look secondly at the 'technical' skills capability. We are avoiding going the other way."

Once in, every employee spends time on the Optus Challenge, a two-day induction program to impart the 'right' values, attitude and culture that, in Webster's view, "is as essential to us as having the skills to design and maintain the network." Managers attend a further one-day program, called the Optus Leadership Challenge, "to keep refuelling the vision." Webster estimates that the management training expenditure in 1992-93 will come in at around $2 million. Direct training expenditure per employee to date (including a capital investment for training equipment) has been estimated at $18,000.

A strong word frequently bandied about to describe one of the 'people' aims of the organisation is 'empowerment.' Talking to staff it is a big factor — employed for their knowledge and expertise they are actually listened to, and they see their suggestions carried out, as one person said, within days rather than working lifetimes.

For others, the environment of empowerment and cooperation is important but their real excitement comes from the opportunity to build a network, or test new approaches. Says one ex-OTC engineer: "This is probably the last opportunity I will get to build a network. It is what I have been trained for."

As with so many of the other start-up intensive functions, recruitment has been outsourced to about half a dozen preferred suppliers and between them they are recruiting 100 people per month. There is unlikely to be a change in those arrangements for 12 months or so. "As long as that rate continues I am not about building any internal empires in support of that," says Webster.

Where are Optus people coming from? There were expectations, and later rumours, that the bulk of Optus' employees would be poached from AOTC — OTC in particular. The anticipated haemorrhage hasn't happened. A Telecom spokesperson says the migration "has been smaller than expected, to be frank. I can only guess they must have adopted some sort of policy restricting themselves to the technical expertise that they definitely needed." Optus' figures confirm that. Of the 1,300-odd people employed between March 1992 and March 1993, only 10% had AOTC anywhere in their background.

About 300 of the 1,600 employees are ex-Aussat people now dispersed throughout the organisation with just one, Dr Wayne Nowland, a Director. Nowland was Chief of Business Operations at Aussat and reputedly the driving force behind the B series satellites; he is Director of Business Development at Optus. And there are 110 expatriates — either BellSouth or C&W — concentrated in the upper levels of the company.

Of the 13 people at the apex of the organisation six are local, three are from C&W, and four are from BellSouth.

Reducing the concentration of expats at the top end is a 'significant challenge' facing Optus right now, says Webster. The idea is that each expat will stay between two and three years and departures will be staggered. That means there is just 12 to 15 months to groom, or locate, successors. There is a very strong preference for locals in those positions, even to the extent of an international search for Australians working offshore.

But Who's the Boss?

The profile of expatriate-for-telecommunications-expertise has created a sense among the media and others that it is the Chief Operating Officer, C&W expat Ian Boatman, that runs the show, closely supported by Cleve Whatley, the BellSouth expat who is Director of Sales and Marketing. When you are asking for an audience at that level, these are the two that are most likely to present. Indeed CEO, Bob Mansfield, has made the point that Boatman and Whatley, and new boy Andrew Bailey, Director of Regulatory and Public Affairs, speak for him. As he told ATUG members recently, Messrs Boatman, Whatley and Bailey are speaking for Optus and they stand or fall on what they say.

But internally there is a strong sense that Bob Mansfield is *the* man. The ex-Mac-

Ian Boatman says Leighton Contractors can lay cable four times faster than Telecom

Donald's Australia CEO was presumably appointed principally for his management/leadership skills. In the 12 months since his appointment he has overseen the foundation of what could arguably be, at just five reporting levels from top to bottom, the flattest corporate structure in Australia; and has cemented management strategies that may not be new or novel in theory, but are rare to see in practice.

Interestingly, the teamwork/cooperation/open channels emphasis begins in the Directors' room. All 13 Optus Directors literally work in the same room. There are no individual offices — not even for CEO Bob Mansfield — and only glass partitions to give a sense of individual territory. They chat amongst themselves as any workers in open plan offices do.

Information flows are, as you would expect in a telecoms company, electronic. Immediately after the board meetings each month, Mansfield and Boatman do a state-of-the-company number which is broadcast to monitors at Optus' major centres, and distributed on video to those people working remotely by the next day. A small 'live' audience asks questions from the floor.

The enterprise-wide e-mail system is accessible by everyone "from Bob Mansfield down." Says Paul Cook, IT and Operations Manager: "executives are keyboard literate and turn around e-mails very quickly so you can talk to them. They encourage it. They say to people 'if you need help or need advice, ask us. If you can't solve a problem locally, just keep escalating up'."

An Enterprising Agreement

Keeping it simple and open is also the philosophy behind the Optus Enterprise Agreement forged with Optus' sole union, the Communication Workers Union (CWU), in November last year. It is unique in covering all job categories. By contrast, explains the CWU's Mark Brownlow, Telecom Australia has different awards for different designations and different managerial levels.

Telecom has a General Conditions of Employment Award (recently accepted by Telecom employees), and then a number of specific conditions awards relating to designations — for example managers have one, there is one for clerical and admin people, and one for line staff. The difference arises because Optus deals with just one union, while Telecom deals with several.

There are some fundamental differences between the two enterprise agreements which, on the whole, tip the balance in the Optus employees' favour. As Brownlow explains it, the main differences are that Optus people work a 38-hour week, and Telecom people a 36.75-hour week; in Optus, sick leave comes as and when you need it, in Telecom it is prescribed; and Optus has a 'minimum rate' award while Telecom Australia's is a 'paid rate' award.

A paid rate means you have a set number of salary levels within each designation, and a person is advanced incrementally within the designation based on conduct, diligence and efficiency assessments until they reach the maximum at that salary band. Optus has a minimum rate, and then a ceiling at about 35.5% above the minimum rate to which people progress, in no set increments, based on performance and assessment.

Brownlow believes that Optus people would be marginally in front in terms of rates of pay, particularly when you take into account the ability to earn a bonus that will almost certainly be larger than the bonus Telecom will be paying. The Optus bonus is a bit of sticking point with the Communication Workers Union. "It is an individual performance-based bonus, which can be subjective, so we have some question marks about how that will operate in the longer term," says Brownlow. Telecom's bonus though, is for all employees based on the company's results — if the company performs, then everyone gets a bonus.

Operationally, Optus' own remuneration structure and incentive schemes are totally subject to management discretion, and are not, therefore, formally part of the enterprise agreement. The company's early negotiating position, according to Webster, "left little to be argued about because we were doing so much anyway to provide competitive benefits. The union was comforted by the fact we were going public with our staff, and cooperated greatly to allow us the flexibility we needed to be effective."

Training For Tomorrow

Optus has a training target that calls for $100 million to be spent by the end of the duopoly period in 1997. That will be met through a combination of internal courses ($20 million already spent) and external 'strategic education alliances.'

A couple of educational alliances are advancing. The company has reached agreement with NSW TAFE for the development of several courses including diploma, associate diploma and certificate courses which, Webster says, Optus will 'pump prime' with students from the company's own trainee intake. Optus is also investigating the establishment, together with other interested organisations, of competency-based standards for the telecommunications industry.

And there have been 'opening discussions' with several universities around Australia but, says Webster, "that is on the backburner given the other initiatives we needed to get up quickly. We are having parallel discussions with some of the bodies in terms of R&D programs."

Keeping the Locals Content

The commitment to research and development and Australian content, according to Costanzo, percolates all through the whole

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company. "We are committed because we think it is the best way to do business and we are pursuing it vigorously."

Costanzo has recently led a collection of strategic suppliers and Optus' key procurement and planning people on a two-week seminar tour of all mainland cities. The seminars were pitched mainly at small and medium sized firms to let them know the opportunities arising in the next two to three years. "We played to a total audience of somewhere between 700 and 800 people around Australia."

The ultimate stick for not meeting the local content target is licence removal, a drastic measure unlikely to be invoked. Costanzo says that although Optus is only required to report to DITAC within 90 days of the end of each financial year, the company is providing quarterly statistics to TIDA (the new Telecommunications Industry Development Authority) to keep it informed of progress. "If TIDA were to see that we were falling down in a particular area they could ring alarm bells earlier," he says.

Costanzo believes the company would not have been able to achieve the network rollout performance it has, had it not been meeting the local content and research and development commitments.

"The two are linked — there is a nexus that you just can't break," he says. Achieving those commitments through alliances with suppliers was one of the things, in his view, that has led to the bid team's planning being pretty right.

"During 1991, when the bid was being put together, there was something in excess of 50 working months devoted to screening for suppliers that were willing to make commitments to Australian content, and to providing product so that Optus could meet the ambitious rollout it had set."

Critics of the Government's local content rules question the validity of including expenditure on earth works and construction in the local content tally. In Optus' case that is its huge up-front construction costs with Leighton Contractors, which accounted for over half of Optus' expenditure to June 1992 (the latest available figures).

But, as Whatley points out, Telecom was the only company in Australia with cable laying expertise. "This is a big enough project that we could easily have imported a company that would have brought its own equipment and expertise.

Instead Optus chose Leighton Contractors and it is now, according to Boatman, one of the world's best. "They can lay cable at four times the speed Telecom can," he maintains. "They pioneered the technique of blowing fibre through ducts, and further developed it to the extent they have doubled the distance they can blow a fibre. Leightons can take its techniques and project management skills anywhere in the world as a result of doing this project."

The Undeclared War

Of course none of these strategies come to anything much if Australians don't take up Optus services. To date customer take up has been good — perhaps as much from curiosity as disenchantment with Telecom — and the much-vaunted customer service orientation has hardly been put to the test.

Telecom MobileNet has been monitoring the numbers taking up the mobile services each month, and what it calls 'churn' — customers leaving MobileNet to go to Optus Mobile. Since November last year, the first full month of the Optus service, the numbers seem pretty steady (at around 15-17%) and churn is diminishing (down to around 1%).

On the long distance service the company claims 352,000 users. But that figure encompasses everyone who has ever dialled '1' for a long distance service, so it does not necessarily indicate true customers. And indeed, with many people having numbers programmed into their Touchphones, and a lot of confusion about exactly when Optus was cheaper than Telecom, many of those 352,000 users would have been one-timers. But on February 1, as much to simplify advertising as to reduce confusion over which company was cheaper when, Optus simplified its pricing structure. It changed its peak hours to 7am to 6pm so that now, claims Whatley, calls on the 10 major Australian routes via Optus will always be cheaper between 8am and 10pm.

Explains Whatley: "Our peak rate on national calling was 7am to 7pm and our off-peak 7pm to 7am. Telecom has three periods — a day, a night and an evening rate. When they went into their night rate at 7pm until 8pm, there was a one hour period in there when they were either equal to or cheaper than us. When you are trying to describe that you are cheaper and when, it is awkward if right in the middle you have a period when you are not cheaper. By going into off-peak at 6pm we are cheaper from 8am to 10pm. Telecom is a little cheaper between 10pm and 8am. We'll give 'em those calls."

Similarly on international calls, Optus has designated 10 major destinations and claims its tariffs are all about 10.5% cheaper than Telecom's 24-hours a day, seven days a week. It claims other destinations are also cheaper to the tune of about seven to 10%.

Aussat: Better Value Than Expected

A curious thing, but in all the years Aussat was operating as Aussat the news we most frequently heard was about its financial problems — Australia's telecommunications white elephant. In fact the company has notched up a couple of world firsts, a 'one-of-the-world's-leaders-in' and, as the satellite division of Optus, is about to score another world first.

Later on this year, Optus will launch MobileSat, its digital satellite mobile system and the first digital mobile system in the world to cover a whole country — a whole continent in this case.

In contrast to the satellite company's early life, it now has an owner that appreciates it. Optus' Chief Operating Officer, Ian Boatman, says "it is an excellent and profitable business." Profitable? "If you had hundreds of millions of dollars debt and your hands tied about where you could compete . . . !!"

"We actually earn better than $100 million a year out of them as a revenue stream," says Boatman. "It's good business, it's good engineering, and it's efficiently run because they kept trying to keep costs down. Now it is able to address the market it should be addressing instead of being blinkered in its approach."

According to Boatman, the Optus satellite division's contract TTC&M (tracking, telemetry, control and monitoring) work is a significant export from Australia. "There is a large number of satellites that can only be tracked from the southern hemisphere, and we do a lot of that."

OTC does too, but principally for Intelsat. And it is fundamentally different work according to Boatman.

"OTC is really controlling other earth stations that are accessing the satellite — your power is too high, drop it down, and let's run these tests together and that sort of thing. That is controlling the ground segment of the satellite."

"What Aussat is one of the world leaders in doing is controlling the satellites themselves. We fire the rockets on satellites three or four times a day, and move them into position and change them to balance the fuel and so on. We get export revenue in the tens of millions of dollars per year for that. The export revenue is inclusive of the software, written in Australia by the Aussat people, which enables those controlling activities."

The new MobileSat has already influenced standards which has the potential to, essentially, broaden the Australian market for handsets and other equipment. Says Boatman: "We have signed a Memorandum of Understanding with the three North American countries — Canada, the US and Mexico. They will ride on our bandwagon in respect of work being done on, for example, the protocols used to control the channels and how the switching would work."

Shelley Spriggs

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Freeset
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Freeset is a business cordless telephone system for people who think on their feet and make decisions on the move. These people can leave their desks and take their pocket sized, full featured extension with them while they move freely around the premises.

When users return to their desks the cordless telephone sits in a cradle and can continue to be used while its batteries are recharged ready for another 3.5 hours talk time or 16 hours in stand-by mode.

Now some, or all of your, PABX extensions can be cordless. A standard interface to the existing PABX system is used. Complete coverage of a site is achieved by placing base stations around the premises to provide radio connection with the Freeset portable. Freeset is not a cellular telephone, and does not attract the call costs associated with the cellular network.

DiriCall®
PERSONAL SECURITY SYSTEM

Workers in high risk organisations - such as prisons, psychiatric hospitals, chemical or manufacturing plants all need to know they are protected wherever they go on the premises. They need a personal security system that allows them freedom of movement and is completely foolproof, they need Diricall.

A compact pocket sized radio transmitting device is carried and when activated will inform others that there is a dangerous situation, identifies who is in trouble and exactly where they are. There are no complex codes to remember or fixed alarm points to run to.

Diricall is a modular system with many advanced automatic actions which removes the need for constant human monitoring. Organisations can utilise as many of these features as they require. Diricall utilises radio based technology which means total flexibility and lower installation costs.

TELETRACER
PERSONAL RADIO PAGING SYSTEM

Teletracer provides instant and discreet contact with your key personnel wherever they may be on your premises. Paging calls can be initiated from your reception desk, any PABX telephone or automatically from alarms such as Fire, Security access control, Building Management systems, Production machines, etc. This ensures that those personnel who have responsibilities for attending to phone calls, alarms and production breakdowns, know immediately and are advised exactly of the situation requiring their action.

Teletracer can also be interfaced to wide area paging networks so that calls and information for those personnel who are away from the premises can also be contacted automatically.

Installation of Teletracer results in greater staff efficiency, quicker reaction to customers and reduces phone bills by reducing call backs.

Both Telecom and Optus maintain they don't want a price war. When asked how determined Optus was to stay below Telecom's prices, Whatley replied "very determined." When asked if Telecom would continue to respond to Optus' price decreases, a Telecom spokesperson said the company will "always stay competitive" with Optus.

"We don't expect to cause a price war. We do expect to cause prices to go down over time. Telecom will respond and will tweak rates here and there and so will we. We have estimated a 40% reduction over five years — I do not consider that to be a price war, its just a natural result of competitive pressures bringing structures down."

The war, or 'normal competitive behaviour,' between Telecom and Optus is in the escalation of the respective advertising campaigns, and in complaints to Austel and the Trade Practices Commission. There is also the small matter of Optus suing Telecom in the Federal Court for allegedly breaching the *Telecommunications Act* with its new tariffing policies.

Yes, It's For You!

The company's success in raising awareness of itself is noteworthy. You get the feeling that it has even surprised Optus a bit. Cleve Whatley says that from his knowledge of these kind of company launches "what we have accomplished in a short period of time is quite astounding. Pretty much absolute — everyone knows who Optus is, everyone knows they are in the telephone business."

Whatley won't reveal Optus' spending on advertising but unofficial reports put it somewhere between $30 and $40 million. Whatley says "find out what Telecom is spending and divide it by four." He maintains the advertising budget is in good shape, but there is a sense that spending may be running fatter than anticipated to stay in a league somewhere close to Telecom when that carrier increased its advertising spend.

One smudge on the good relations tally sheet came early in the first year when post-licence Optus people virtually disregarded the work several advertising agencies had put into pitching for the Optus account at the request of the bid team. Something the bid team didn't get right, according to Whatley. "A small committee of the bid team started preparing to get the advertising team picked before the management team was established," explains Whatley. "They sent out briefs and culled a short-list down to five agencies before the licence was awarded."

Four agencies — Foster Nunn Loveder, Lintas, Magnus Nankervis and Curl, and SSB Advertising — maintained they spent between $100,000 and $150,000 on their presentations which they never got to show because Optus appointed George Patterson. The four threatened legal action. Optus is believed to have paid $10,000 to each "to maintain goodwill."

"The biggest problem," argues Whatley, "was that none of the agencies on that shortlist where in the top 10 agencies in Australia. Take an agency with $50million billing right now and throw in another $30 million and they have to increase their whole agency so much they will depend on that piece of business. It is very risky, so when Ian [Boatman] and I came in February 1992, we stopped the process."

"I think those agencies took a lot of risk getting involved in a project when there was not even a management team or a licence awarded at that time. I feel real comfortable we handled it correctly. I don't believe we owed them a thing, [the payment] was more of a goodwill gesture."

Sleeping With the Enemy

There are certainly no grand goodwill gestures between Optus and Telecom, but then relations aren't so bad either. In Boatman's view the two companies enjoy good relations, "bearing in mind the enormity of the task and the fact that in some areas we are just getting to know each other."

Telecom's Steve Wright says that "on the whole relations have been good but, naturally, in a competitive environment there is going to be times when you are not going to see eye-to-eye."

Both companies point to the amount of detail negotiated between them for interconnect arrangements and for the supply of information about customer billing; to the situations in the field where Telecom and Optus people are working side-by-side; and the recent round of negotiations on preselection to illustrate that, at least on these levels, there is cooperation.

In other areas the rules are different. Optus complained to Austel about Telecom's Flexi-Plan advertisements, and Austel subsequently referred the complaint to the Trade Practices Commission. The TPC Referred it to the Federal Court where it had a Directions hearing on February 16 and was scheduled for a later date.

The complaint, about misleading advertising, points to the fact that Telecom quoted prices with the Flexi-Plan discount but without factoring in the up-front cost of buying a Flexi-Plan. Wright says the monthly rental was mentioned at the bottom of the ad and marked with an asterisk. Telecom countercomplained about Optus advertising and that too was referred to the TPC. And, according to the TPC's Richard Fitzpatrick, complaints about both carriers' advertising has also been received from the general public. At this stage, says Fitzpatrick, the TPC is speaking to them and seeking their cooperation.

That cooperation may now be hard to find with Optus upping the ante in a serious fashion by announcing in early March that it had started legal proceedings over Telecom's Strategic Partnership Agreements and certain Flexi-plan pricing options.

Bits of B2 may be scattered around the stratosphere, but the B1 satellite is now operational

Another bone of contention between the two arose over the billing arrangements for Optus' 0099 satellite service between Sydney and New Zealand. Optus wanted information about 0099 users so it could market them to migrate them off 0099 and onto its dial 1 long distance service. It alleged that Telecom did a go slow in separating out the information and getting it to Optus. In the meantime, 0099 users received telemarketing calls from Telecom. Says Whatley: "We are unable to substantiate whether Telecom was calling them because they were an 0099 customer, or was calling them anyway."

Telecom says the information was supplied according to a previously agreed deadline. The implication here is that Optus wanted the information more quickly than it had previously thought, but that because it hadn't requested special consideration in advance it didn't get it.

A Poetic Licence?
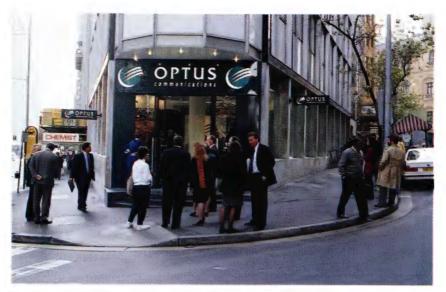
But the major rift is over the licence condition which required Optus to supply service to 45% of the Australian population by December 31. While Optus has fairly plausible explanations or escape clauses for the all the hitches experienced over the past year —

and this issue is no exception — its failure to literally meet this requirement has set the company sniping at Telecom. And to a certain extent at the legislators who drafted the licence conditions. At stake was an up-to-$10 million fine and some bad publicity. The fine never really looked on the cards, the publicity could have been worse.

Optus' says that it never actually agreed to cover a literal 45% of the Australian market in the first 12 months. Paddy Costanzo, who at that time was a key member of then Transport and Communications Minister Kim Beazley's staff and therefore claims prior knowledge of the process, says that Optus' commitment was always to provide services to Canberra, Sydney and Melbourne in the first year. "Someone said 'that is about 45% of the population.' And for some reason — don't ask me to explain it because it is just one of those things that happens — that ended up being written on paper and accepted as one of the documents," explains Costanzo.

"We were aware that that [percentage] was there and, at the end of the day, if you take population as every single Australian, there is no excuse. But the intention, the spirit, has always been Melbourne, Sydney and Canberra, and they were covered."

The explanation has not always been so straightforward. Several times — in fact until Telecom CEO, Frank Blount, told him to cease and desist — Mansfield made an attempt to shift the blame, implying to the press that Optus' failure to meet that requirement was the deficiency of CLI-capable (calling line identification-capable) Telecom exchanges. Optus people also point out that to December 31 was only 11 months operation for the company.

Open for business: Optus has opened retail centres in most capital cities

Austel's Ian Slattery diplomatically says of the issue: "[Optus] had a different view on how that condition should be achieved compared to what Austel had. We are now in the process of sitting down with Optus to reach a common understanding on licence conditions so they know what to expect of them. There are another three or four conditions on network rollout that come up before 1997, so we need to have a common understanding."

The upshot was a two and a half month grace period in which time, as Telecom points out, Optus has the benefit of Telecom's exchange-upgrade program since January 1 to help them make the 45% cut. Says Wright: "In other words exchanges that they will be cutting over to make the 45% mark

were never, according to plans, going to be available by December 30 last year."

Had Optus been fined, it would have been a Ministerial decision not Austel's. "All we could do was direct Optus, or any other carrier, to rectify a breach of licence," says Slattery. In theory, if the breach is not rectified, Austel refers the matter to the Minister. "We took the approach of not being ridiculously bureaucratic because there are arguments on both sides as to how that licence condition should be interpreted. We have allowed them until March 15 to comply with the licence condition in accordance with Austel's interpretation."

But What About Business?

The publicity surrounding the 45% coverage issue has actually worked some in Optus' favour and got them off the hook as far as business customers are concerned.

Bruce Hall, Chief Manager, Communications, for the Commonwealth Bank, says that when Optus began its promotional campaign, "the business community expected to see a parallel marketing drive. It didn't eventuate so naturally we asked questions.

"At the time I and others were critical, but when I reflect back now I can understand that they had to try and meet that 45% penetration and their best chance of that, when you are talking in the way the Government measures it, was to really hit the domestic phone market. I think it was a perfectly reasonable approach." Hall adds that until Optus gets its physical network between the cities completed, it is not easy for them to offer the sorts of services that big corporates like the Bank are looking for.

Onward and Upward

One year out Optus has cause to be on an adrenalin high, and when adrenalin is high nothing hurts, not even growing pains. The coming 12 months should see the company

B2 Not Such a Loss After All

Optus' customer relations haven't always been silky-smooth. A bit of displeasure was whipped up momentarily among the broadcaster customers — but that too turned to Optus' favour.

The Optus B1 (successfully launched in August on its second attempt) and B2 satellites were to replace the aging A1 and A2 satellites, although not necessarily immediately. Says Boatman: "A1 has gone and B1 is working perfectly. But we had a plan to try and do without B2 for two years — to park it — and we floated that to our customers."

As Boatman explains it, the plan then (and that was put into action when B2 strayed) was to release A3 by transferring everything from A3, which has several years left to run, onto A2 or B1. A3 would then be moved across to A2's parking lot, traffic transferred back onto it, and A2 freed for use in other ways.

"Customers objected because it gave them some hassles that they didn't have to go through unless B2 failed. I said this allows you to do this at your leisure, and you would have to do it anyway if it failed, and they said let's wait till it fails." Prophetic words.

The 'hassles' were actually substantial costs that customers would have to bear to repoint their earth stations — estimated at about $1 million for Channel 9, $500,000 for CAA, and around $300,000 for AAP.

The customers succeeded in turning around Optus' 'parking' option just days before B2 went missing.

So the loss of B2 has not affected Optus at all. Its gets its own way in fully utilising A2 and A3 before they run out of fuel; and it gets a new satellite, eventually, gratis from either the Chinese launch company or the satellite manufacturer.

Shelley Spriggs

'legitimised' to a fair degree — its own GSM digital mobile network will be operational; it will be carrying its own traffic on the big east coast routes; it will have introduced its business services and presumably have some corporate customers; and it will have its very own long distance customer base following the preselection ballot scheduled for around September in Canberra, Sydney and Melbourne.

Preselection could be the most important public relations exercise the company ever has to undertake. The details of how preselection will progress was thrashed out between Austel, AOTC and Optus. What is known so far is that nine to 12 months after the dial 1 service has been introduced to an area, there will be a ballot where all telephone subscribers will be asked to select the carrier they want to register with — their primary carrier if you like. To access their non-primary carrier's services at any time, customers will simply dial the '1' prefix.

If there is a response rate of less than 65% in an 'electorate,' a second ballot of the people who didn't respond will be held in that electorate. Anyone who failed to respond to the second ballot will, by default, remain an AOTC customer.

How well the company fares in the ballot is expected to influence the outcome of the major shareholder's (Optus Pty Ltd) proposed public float — another important public relations exercise.

Optus Communications is 49% owned by C&W and BellSouth (24.5% each), and 51% owned by Optus Pty Ltd. Shareholders in Optus P/L are Mayne Nickless Limited (49%); AMP Society (19.6%); National Mutual (11.8%); and AIDC Telecommunications Fund Members (19.6%).

It has always been the intention of Optus P/L that Mayne Nickless' shareholding (its current investment is $375 million) would be sold down, perhaps to as little as 10% of Optus P/L. Current speculation is that the float could be around September-October, but the Optus P/L board has yet to make a decision.

When announcing the Mayne Nickless results at end of February, CEO Bill Bytheway passed an opinion that, in his view, the issue was going to be complicated by the preselection ballot on two fronts. The first was that the development of the prospectus for the float would take a significant amount of senior Optus Communications management time, and he thought they could ill-afford to be concentrating on that in the middle of a preselection ballot. And the second was that for the prospectus to be meaningful, and to properly inform the market, it should probably be delayed until after the ballot when market shares are better known and therefore the shareholding worth can be more accurately evaluated.
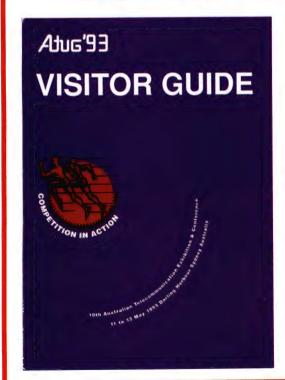
A research report by stockbrokers J.B. Were dated October 1992, estimates that Optus is set to show a positive return by 1994. The detailed business plan that Optus is following, and which has proved drop dead accurate to date, says the same thing. In a recent interview in the National Australia Bank's *Decisions* magazine, CEO Bob Mansfield predicted a positive return from a profitability point of view towards the end of 1994, and from a cash flow point of view in early 1996.

If Bob Mansfield's enthusiasm is catching, then there will be more adrenalin than champagne flowing at Optus for some time. In *Decisions* he said:

"One of the things I say to my people is that we must be hell-bent on proving to our shareholders that we can do the job, and to make it a matter of personal pride that we can. Why can't we be recognised as the company that did the best job in the world on designing, putting in place and running a telecommunications company?"

Shelley Spriggs is a freelance journalist based in Sydney, NSW.

Get Ready For Multimedia Networking

The enterprise video network is the architecture of tomorrow, so network managers need to start planning now to restructure their internetworks for video traffic.

Most network managers probably think they've got the big picture when it comes to video communications — and they're taking a decidedly wide area view of the subject. Why worry when business video is mostly a matter of making sure enough switched circuits or private lines have been ordered to link the videoconferencing units in remote meeting rooms? Sure, some inverse multiplexers may have to be deployed, along with MCUs for multipoint meetings, but it's nothing to get worked up about.
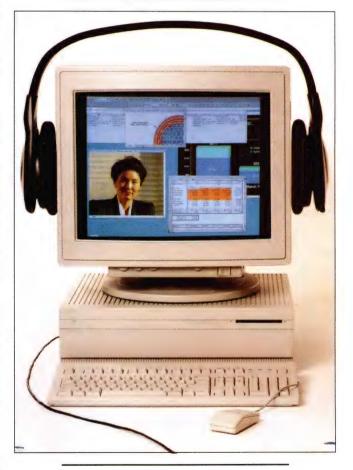
It's almost as if these network managers have never heard of multimedia. Or maybe it's just that most of them have written it off as a niche application or a futuristic technology that can always be investigated tomorrow.

There's only one problem with this wait-and-see attitude. Plenty of users know all about multimedia. And they're not content with just spreading the word about how full-motion video, still images, animation, and sound can dress up drab text-based applications. They want to see (and hear) multimedia out on the network, so they can start collaborating with colleagues throughout the building, across the campus, and (better believe it) over the wide area. And they'll be happy to tell network managers all about it when they call to complain about glacial response times, missing data, and other problems that proper planning could have eliminated early on.

It can't be said too strongly: Network managers foolish enough to ignore multimedia are courting disaster. Consider the following: Just about every vendor with a stake in the desktop seems to see multimedia as a way to bring new lustre to product lines that are increasingly viewed as near-identical commodities. The biggest players — Microsoft, Apple and IBM — now offer low-cost software extensions that make it simple (and seductively inexpensive) to add multimedia to office automation packages. Microsoft, for instance, is hawking a $200 upgrade to Version 5.1a of Word for the Macintosh that allows digitised movies to be spliced into documents as desired.

Not all multimedia applications are going to be so heavily discounted, of course. But suppliers are being very careful to keep costs low enough (and far below original predictions) to entice a broad spectrum of potential customers. That means that even without a killer application to drive it onto the desktop, multimedia (in some form) is going to be too attractive for most users to pass up.

According to New York-based investment banking firm Morgan Stanley Guaranty and Trust, 'the total market for digital video could grow to $US50 billion by the end of the decade, with the PC-based segment accounting for about $US20 billion.'

Even staid and sober IBM is taking multimedia very seriously. Big Blue is looking to make high-resolution graphics, CD-ROM and interactive video standard on a range of PS/2s. And Intel has been busy signing technology partnerships with vendors to ensure multimedia hardware is in plentiful supply and the necessary interfaces and APIs (application program interfaces) are in place.

Given this level of activity, network managers best make sure that their enterprises are really ready for video in all its multimedia

Putting the Squeeze on Video Data

Data compression is generally seen as the key to sending high-quality, full-motion, full-screen digital video across a network. But compression is actually only one of three elements that must be addressed. The other two, screen resolution (or size) and frame rate, are commonly traded off in order to cut down on the amount of video data that must be processed by a compression algorithm.

The reason for such trade-offs becomes clear when it's understood that displaying the digital equivalent of television quality analogue video on a PC calls for a resolution of 640 by 480 pixels, 24-bit true colour, and a frame rate of 30 frames per second (fps). This translates to an uncompressed data rate of roughly 240Mbps. (The digital equivalent of HDTV requires a staggering 1.2Gbps.)

Right now, 25:1 compression ratios are enough to deliver 'acceptable' quality video for a quarter-screen image. To achieve a transfer rate of 1.2Mbps, the speed at which CD-ROMs used in most standalone multimedia applications ship data to a PC, the amount of video would have to be reduced by as much as 200:1.

Codec Considerations

The key to bringing video to the desktop is the video codec (coder/decoder). At the low end are software-only codecs such as Quicktime from Apple and Audio Visual Interleave (AVI) from Microsoft.

Both make use of asymmetrical algorithms, which means they only handle decompression. Either is fast enough to support small-screen animations at 15-30 fps, depending on the PC's CPU.

The next step up is represented by Digital Video Interactive (DVI) from Intel. DVI consists of two asymmetrical algorithms, production-level video (PLV) and real-time video (RTV). PLV can only be played back in real-time playback, but only to one-quarter of a screen (even with hardware-assist).

JPEG (the Joint Photographic Experts Group) has developed a new symmetrical codec that has been adopted as a standard by both the CCITT (International Telegraph and Telephone Consultative Committee) and ISO (International Standards Organisation). Although the algorithm was originally intended for single images, it has been adapted to motion video by California-based firms LSI Logic Corporation and C-Cube Microsystems. JPEG's algorithm is so compute-intensive that even with these chips' highly specialised architectures, real-time (30 fps) compression/decompression is limited to 10:1, restricting symmetrical real-time applications to a window about one-fifth of a full screen.

MPEG (the Motion Picture Experts Group) is now working on a new codec to handle entertainment-quality video played back from CD-ROM or disk. By analysing sequential frames for redundancies, the MPEG algorithm can achieve compression ratios of 50:1 to 200:1. But such impressive ratios come at the cost of asymmetry: MPEG will be best for off-line video production.

The CCITT's H.261 (better known as Px64) has been developed for videoconferencing. Its symmetrical algorithm is similar to JPEG's but exploits redundant information between frames and compensates for motion between adjacent frames. Px64 specifies a range of video quality commensurate with bandwidth (from 64-Kbps to 2Mbps). It is being adopted by all the major videoconferencing vendors.

One thing is clear: No single codec out there can do it all. For a desktop to participate in a range of multimedia applications, it's going to need more than one codec. This may be the reason California-based firm Integrated Information Technology developed a micro-programmable videoprocessor (VP) chip that can handle JPEG, MPEG, and Px64 compression and decompression algorithms. The VP is the underlying technology in AT&T Videophone 2500. It should find broader applications as the market matures.

New approaches to compression are being explored by startups and research labs. According to Iterated Systems, its hardware-assisted fractal transform algorithm is capable of achieving compression ratios of 2,456:1. And AT&T Bell Laboratories has a so-called wavelet approach that could potentially yield compression ratios 40 times higher than those possible with symmetrical algorithms.

With faster chips and improved algorithms, it appears that a tenfold boost in codec performance is readily attainable. This would meet the 200:1 compression requirement for networked multimedia.

Certainly, boosting video compression 10 times would be far more cost-effective and much less disruptive to the network than attempting to deliver a tenfold boost in bandwidth to the desktop.

Nick Lippis

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splendour. That means taking steps to restructure the infrastructure, converting today's internetworks into tomorrow's enterprise video networks.

First off, network managers need to begin to microsegment their LANs to ensure that users aren't short-changed when it comes to bandwidth. Microsegmentation means assigning fewer users per LAN segment, and that in turn means a greater reliance on segment-switching technologies that integrate bridging, routing, Ethernet-switching and asynchronous transfer mode (ATM). When pushed to the limit, microsegmentation creates a desktop LAN (a LAN segment with only one user). This eliminates the need for a separate physical network for video.

Most likely, hubs will be the networking gear used to tie the video enterprise together, especially since low latency is a must for desktop video. Either Ethernet or ATM switching hubs will be used to establish permanent or virtual switched circuits; routers have almost no place on the video network.

Finally, while most of the multimedia applications now reaching the desktop are based on store-and-forward video, conventional videoconferencing depends upon on real-time interaction. But videoconferencing on the desktop is only a matter of time, which means the enterprise video network must be able to accommodate bandwidth-intensive PC-based videoconferences. For some analysts, this suggests that FDDI or ATM will be extended right to the desktop.

There is another possibility — one that's far more likely. Given ongoing work in compression technology, there's a very good chance that a breakthrough is imminent that will allow a full-scale video enterprise to be built with Ethernet.

A Look at Video Networking

The coming generation of enterprise video networks will bring together a diverse mix of technologies: Conventional videoconferencing units and MCUs (multiport control units) will be used alongside new multimedia extensions to the desktop and a new class of videoservers to transport analogue and digital video to clients throughout an organisation (see Figure 1 on page 73).

Thanks to a wide range of interfaces, the new enterprise video network will also be able to link to other enterprises, circuit-switched public videoconferencing services, and cable television networks. Thus, a user anywhere on the video internetwork will be able to share multimedia files with other users, to carry on videoconferences across the wide area, and to stay abreast of the latest news on CNN.

The key to this enterprise approach to multimedia is the videoserver, a specialised type of server that, in essence, will allow video traffic to be integrated into current LAN technology. Given the range of activities that desktop video involves, the

videoserver may not be implemented on a single platform but actually may require two or three 386 or 486-based PCs.

Simply put, the videoserver frames compressed digital video signals so that they can be sent across a LAN. It uses a mix of off-the-shelf and proprietary video compression chips to deliver the requisite variable-bandwidth sessions. The unit also links to public videoconferencing services and circuit-switched services. A videoserver also converts analogue TV signals to compressed digital video.

Among its many functions, the videoserver will set up and oversee desktop videoconferences among multiple participants, each of whom will be displayed in a window on-screen. Since one videoserver can create a composite display from signals fed to it from different desktops and videoconferencing units, it makes it possible to dedicate a single session to each participant, thus conserving bandwidth.
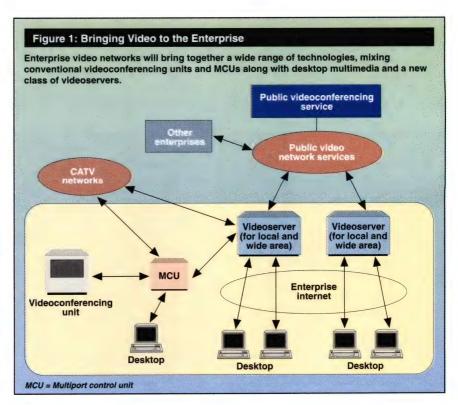
The videoserver also stores the digital video clips that would be used in such applications as videomail, training, and similar multimedia applications. Since it must be able to handle video compression and analogue-to-digital conversion, a video-server needs a great deal of specialised hardware. And the demands of store-and-forward services will require huge amounts of disk storage, such as that offered by RAIDs (redundant arrays of inexpensive disks) or optical media.

Videoserver Vendors

Right now, the videoserver market is very much in its infancy, with only three primary players. Massachusetts-based Fluent Incorporated has concentrated its efforts on developing products compatible with Net-Ware servers and NetWare clients running Microsoft Windows. For all intents and purposes, Fluent's products constitute a multimedia extension to NetWare version 3.11 that will make it possible for Novell and its list of technology partners to compete with Apple Computer and Microsoft as platform providers for independent software vendors (ISVs) working on client-server multimedia applications.

Fluentlinks is a NetWare Loadable Module (NLM) that enables video applications to be distributred to clients over Ethernet and FDDI. Fluentview, Fluentpresent, and Fluentcreate are a family of packages that deliver software-only video playback; software-only playback and editing; and hardware-assisted video capture, editing, and playback.

Fluent also has a line of video-capture ISA (industry standard architecture) boards (VSA-1500C) and video compression/decompression ISA boards (VSA-1500P). The company also is now looking to exploit JPEG (Joint Photographic Experts Group) technology for a brand new range of sym-

metrical multimedia personal computer applications, such as remote collaborations based on a shared workspace.

Besides Novell, Fluent has set up an impressive array of partnerships for development and marketing new products, including Digital Equipment Corporation, NCR and Texas Instruments, and has also signed a deal with Protocomm, another videoserver vendor, to integrate the latter's Videocomm server into Fluentlink.

Similar to Fluentlink, Protocomm's Videocomm software is an NLM. It works with any digital video technology that supports simultaneous file access over Token Ring, Ethernet or fibre optic networks. Its low-end Buspak accommodates five users, while its midrange Highpak-25 supports up to 25 video clients on multiple segments.

Videocomm potentially can support any client compatible with Novell NetWare, including Macintoshes (if Apple's Newvideo Quicktime/AVI adaptation software is installed) and personal computers running Windows, DOS, or OS/2.

California-based Starlight Networks has announced Starworks software, which turns a 486-based EISA PC into a videoserver that communicates with the desktop via special video networking protocols. Starworks supports all popular video formats, PCs, and network operating systems and their underlying protocols. The server architecture is optimised to deliver streaming video data stored on a RAID to multiple clients.
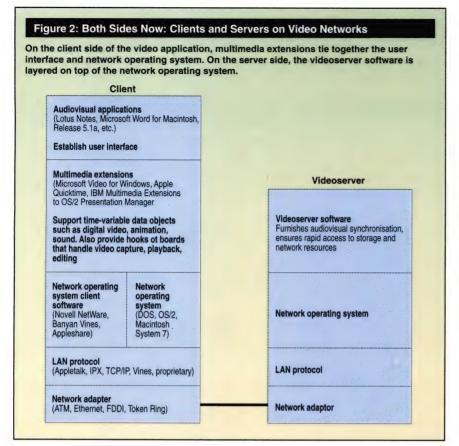
Starworks servers can deliver an aggregate network throughput of 25Mbps, enough for 20 simultaneous digital video interactive (DVI) clients.

Multimedia to the Desktop

Without a doubt, 1992 saw an unprecedented release of products and technologies that are helping multimedia onto the desktop. Video capture and playback boards are now available for most PCs and workstations. Minimal upgrades to file servers for popular network operating systems like NetWare, Banyan Vines, IBM LAN Manager, and Appleshare can deliver VHS-quality audiovideo playback over LANs, while teleconferencing-quality live video can be captured by workstations and conference room systems and transmitted over the local and wide areas.

The client side of a LAN video application may consist of Lotus Notes, Version 5.1a of Microsoft Word for the Macintosh, or a similar package that features both direct links to an operating system and interfaces to multimedia extensions (see Figure 2 on page 74). The extensions (such as Microsoft's Video for Windows, Apple's Quicktime, or IBM's Multimedia Extensions for OS/2 Presentation Manager) also have interfaces to video-assist boards that take care of capture, compression, editing, and so forth.

A network adaptor is used to link to Ethernet, Token Ring, or FDDI. Logical connectivity between client and videoserver is established by LAN protocols such as IPX, TCP/IP, or Vines; proprietary protocols support streaming video. On the server side, the videoserver software is layered on top of the network operating system and ensures high-speed access to stored video. It also synchronises audio and video.

Figure 1: Bringing Video to the Enterprise

Enterprise video networks will bring together a wide range of technologies, mixing conventional videoconferencing units and MCUs along with desktop multimedia and a new class of videoservers.

MCU = Multiport control unit

Figure 2: Both Sides Now: Clients and Servers on Video Networks

On the client side of the video application, multimedia extensions tie together the user interface and network operating system. On the server side, the videoserver software is layered on top of the network operating system.

Client

Audiovisual applications
(Lotus Notes, Microsoft Word for Macintosh, Release 5.1a, etc.)

Establish user interface

Multimedia extensions
(Microsoft Video for Windows, Apple Quicktime, IBM Multimedia Extensions to OS/2 Presentation Manager

Support time-variable data objects such as digital video, animation, sound. Also provide hooks ot boards that handle video capture, playback, editing

Network operating system client software
(Novell NetWare, Banyan Vines, Appleshare)

Network operating system
(DOS, OS/2, Macintosh System 7)

LAN protocol
(Appletalk, IPX, TCP/IP, Vines, proprietary)

Network adapter
(ATM, Ethernet, FDDI, Token Ring)

Videoserver

Videoserver software
Furnishes audiovisual synchronisation, ensures rapid access to storage and network resources

Network operating system

LAN protocol

Network adaptor

Changes to networks always come from the desktop out, and multimedia is no exception to this rule. The best way to see where the enterprise is headed, then, is to watch where Apple, IBM, Microsoft, and Intel are headed.

Apple's Quick Decision

Quicktime, Apple's multimedia extension to its operating system, has been available for only about a year. It allows Macs to accommodate time-variable data objects such as digital video, animation, and sound along with text and conventional graphics. Quicktime is a sophisticated multimedia architecture; it costs $325 and is bundled with the Mac Operating System 7.1 upgrade kit.

Quicktime synchronises audio and video components by regulating the frame rate, and one of its strengths is that it delivers quite good resolution and throughput without expensive hardware.

With Apple's new Compact Video compression algorithms (supplied with Quicktime Version 1.5) a Mac LC should be able to achieve 10 frames per second (fps), a third of the throughput needed for full motion for a 360-by-240-pixel image (about one-quarter of a screen). A high-end Quadra 950 boosts the playback rate to 40 fps for flicker-free video. By adding a third-party video board, such as the Videospigot from Supermac Technology, videorecording and real-time playback (30 fps) can be had for larger screens (640 by 480 pixels).

At faster frame rates and larger screen sizes, though, Apple's low-end Localtalk networking protocol quickly becomes a major bottleneck, forcing users to upgrade to Ethernet and high-speed LANs. Even at slower speeds, Localtalk is really not appropriate for multimedia networking.

Quicktime (thanks in part to its low price) has garnered the support of a good number of users and developers, including Adobe and Aldus. There are 300 applications that use Quicktime now shipping, with another 100 expected by the end of the year. But this lead is likely to dwindle rapidly now that Microsoft has rolled out its comparable Audio Visual Kernel (AVK) extensions for both Windows and OS/2. Since Microsoft's recently released Video for Windows (VFW) can play Quicktime movies, a path has been opened from the Mac to the PC, and application developers will surely take advantage of it. Apple, for its part, has come out with a version of Quicktime for Windows.

Still, there are around 80,000 Windows development kits in the hands of software writers. If only 10% of these developers write applications that take advantage of Quicktime or AVK, we may see 8,000 multimedia applications in 1993.

Microsoft, Intel and Company

Microsoft has been working with both IBM and Intel to develop multimedia extensions and APIs for PC operating systems. The IBM collaboration led to the Media Control Interface (MCI), which is part of Big Blue's Multimedia Extensions for Windows and OS/2 Presentation Manager. MCI isolates applications from the idiosyncrasies of specific audio and visual devices, including VCRs, CD-ROMs, image scanners, and MIDI sequencers (MIDI, or musical instrument digital interface, links computers and electronic instruments).

Microsoft and Intel have announced a new class of digital video devices that will add MCI to video-compression hardware such as Intel's Action-media II boards for DVI. Hardware-assisted DVI is theoretically capable of playing back 1024 by 768 pixel (24-bit colour) at 30 fps, a higher resolution than National Television System Committee (NTSC) video has. Combining MCI and DVI also will make Microsoft's operating environments compatible with other high-performance video boards.

Microsoft's new Audio Visual Interleave (AVI) component of its Audio Visual Kernel is the glue that binds its multimedia development efforts to those of Apple, IBM, and Intel. AVI is a standard file format for video and audio data. Co-developed with Intel, AVI is a remarkable effort that links the four powerhouses of the PC industry. It could very well turn the industry away from its current low-margin, high-discount mentality back to the glory days of high profits and highly differentiated product lines.

AVI is the foundation of Microsoft's Video for Windows (VFW) package. VFW includes tools for capturing, editing, and playback, as well as for converting Quicktime movies. It supports three compression interfaces: Microsoft's Run Length Encoding (RLE) scheme; Video 1; and Indeo. VFW includes an Object Linking and Embedding (OLE) server that lets video be pasted into other applications.

Intel's software version of DVI, called Soft Real Time Video (SoftRTV), will also be compatible with the AVI file format. VFW and SoftRTV, without hardware assist, can reportedly playback at 15 fps.
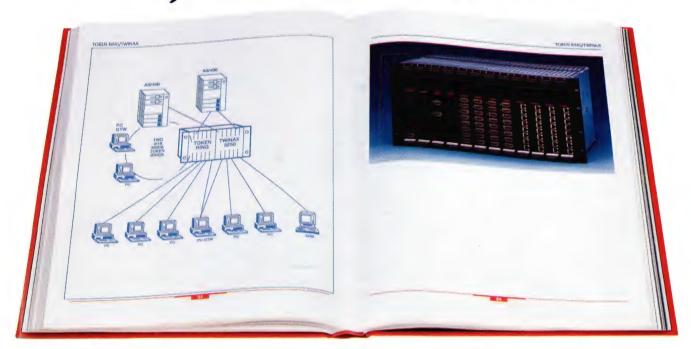
IBM Opts For Multimedia

IBM faces a very big challenge in trying to distinguish its multimedia offerings from those of the clone makers waiting to exploit technology from Microsoft and Intel. Its goal is to make the PS/2 the platform of choice for multimedia applications.

Its strategy is also direct: Do a matchless job of making high-resolution graphics, CD-ROM, DVI, and other related technologies standard features on a broad range of PS/2s that will appeal to entry-level users as well as power professionals.

The recently announced Ultimedia PS/2s represent a major step in implementing this strategy. In addition to multimedia extensions to OS/2 Presentation Manager, the PCs feature the Person-to-Person/2 desktop vid-

The book on hub applications has just been rewritten.

Introducing SpiderNet. The first smart hub that can be shared by AS/400 and Token Ring.

In the past, only LANs could enjoy the advantages of intelligent hubs.

Today, there's SpiderNet, a multi-media wiring concentrator, bringing increased intelligence and flexibility to IBM midrange networks.

Managing your AS/400 or S/3X network has never been easier. SpiderNet's fault tolerant platform detects and isolates cabling and hardware troubles without disrupting other devices. All enclosures and modules down to the port level can be managed by SpiderNet NMS Network Manager.

SpiderNet supports a variety of twinaxial multiplexer and active star modules. Equipped with two twinax buses, it connects to two local or remote S/3X or AS/400 systems simultaneously.

SpiderNet follows AS/400 and S/3X protocols. Its protocol transparent operation is compatible with a broad range of networking application software, including SNMP and NetView.

In addition, you can connect multiple Token Ring stations to the same AS/400 as your twinax devices via SpiderNet in a structured star topology. This duality lets you use SpiderNet as a twinax hub serving up to 70 twinax stations, a Token Ring hub serving up to 192 Token Ring stations or a hub serving twinax and Token Ring networks at the same time.

For more information on how to concentrate your midrange network and become more efficient and productive than ever, call Dataplex.

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D A T A   C O M M U N I C A T I O N S   N E T W O R K S   A N D   E Q U I P M E N T

eoconferencing system, which lets users engage in live, interactive video exchanges with shared screens, pointers, and whiteboards. Video capture requires Intel's Actionmedia II boards.

Within two years, the Ultimedia line will include laptop and notebook models and feature user-friendly interfaces, pen inputs, voice recognition, and touch screens. XGA (the next generation of VGA), DVI, and digital signal processing will be on the motherboard.

On a related front, IBM is looking to span the software spectrum (from DOS to Windows to OS/2) by defining the Ultimedia Tool Series. This tack, which seeks to maximise common aspects of the extended versions of these operating systems, should appeal to ISVs. If successful, users may well see Ultimedia for Windows and DOS along with the Ultimedia PS/2s sometime in the future.

Even though RISC/Unix workstations from DEC, Hewlett-Packard, Silicon Graphics, Sun Microsystems, and similar vendors have the processing power, networking capabilities and graphics needed for multimedia, this class of applications really has not caught on with workstation vendors. At last count, only 70 ISVs are developing applications for Sun's Solaris operating system, compared with the aforementioned 8,000 for Windows.

Some workstation vendors are collaborating with third-party developers of intelligent video boards to establish a presence in the video capture and playback market. HP offers the 24-bit Videolive card developed by Rasterops for HP's 9000 EISA workstations. Silicon Graphics has agreed to offer the Open Media Framework (OMF) software and JPEG video board from Massachusetts-based Avid Technology. The pair now makes it possible for Silicon Graphics workstations to address high-end applica-

tions like professional TV and postproduction for films.

Sun has added audio and ISDN support to its motherboards and offers a Videopix card that makes the Sun workstation an attractive media-ready platform for third-party software development. DEC is taking a more aggressive stance, introducing the DEC Sound/Picture Information Network (DECspin) software for DECstation 5000 RISC workstations running Ultrix equipped with the DECvideo and DECaudio options. Multimedia extensions for Ultrix are furnished by the Xview software module. DEC also is working closely with Fluent on video playback options for LANs.

Videoconferencing View

The leading videoconferencing system vendors — BT North America, Compression Labs, GPT Video Systems, NEC, Picturetel and Video Telecom — typically supply relatively high-priced videoconferencing codecs (coder/decoders) and systems suitable for conference room applications.

Several of these vendors are seeking to apply their standard (Px64) or proprietary codec technology to desktop and consumer gear. Picturetel, for one, is working with IBM to incorporate its PCS-1 videocodec in the Ultimedia PS/2s, and with Lotus to create a video interface for Notes. CLI has announced the Cameo videoconferencing system for the Mac and supplies the codec board used in AT&T's Videophone 2500. BT markets an ISDN videophone in Europe and is yet another of IBM's multimedia development partners.

Both Picturetel and Video Telecom have similar strategies and hope to deliver enterprise-wide video systems that, in particular, extend real-time videoconferencing and playback video services to the desktop. But if this strategy is to be realised, the video marketplace will need to be restructured. At

the very minimum, new partnerships and joint technology agreements will have to be forged between computer companies and codec suppliers. It's also very likely that videoserver vendors and videoconferencing vendors will team up to bring playback and conferencing to the desktop.

Microsegmented Management
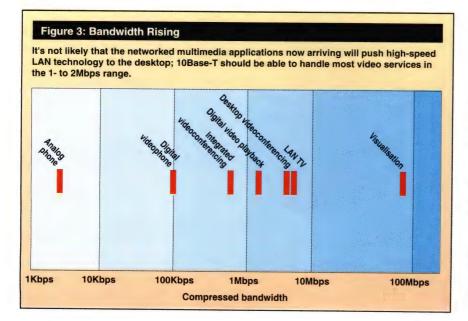
Video, which consumes the most bandwidth of all multimedia applications, will also have the largest impact on existing networks. But even though the case for store-and-forward video (for training) and real-time video (for conferencing) could be made with relative ease, it's unlikely that either will see widespread use soon. Digital broadcast video in a window on a PC sounds intriguing, but it's going to be tough to justify the expense outside of those business segments (like finance and brokerage houses) that depend on real-time awareness of world events.
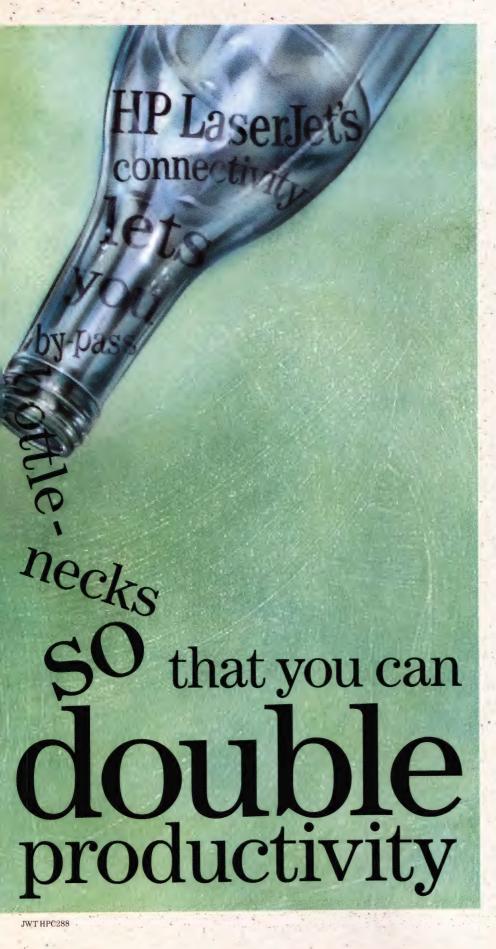
Thus, it's unlikely that the sort of networked multimedia applications coming in the near future will drive highspeed LAN technology to the desktop. In fact, 10Base-T will most likely be the interface of choice for multimedia networks while throughput requirements stay in the 1 to 2Mbps range (see Figure 3).

This is not to suggest that today's LANs are ready to accommodate multimedia networking without any modification at all. The most noticeable change will be seen in the growing reliance on microsegmentation that will accompany the need for uncontested local bandwidth. Simply put, microsegmentation is an architectural strategy that limits the number of users on a local area network segment in relation to each user's bandwidth requirements. Eventually, a single user may claim an entire LAN segment, creating a desktop LAN. As microsegmentation becomes the order of the day, the familiar shared network topology will evolve into a two-tiered star, with switching both between LAN segments and within the backbone (see Figure 4 on page 78).

Backbone networks will have to support multiple 1 to 2Mbps multimedia flows between floors or equipment closets. In a large building with thousands of users, 10Mbps would be able to support a desktop video-conference with no more than two or three participants. A 10Mbps backbone would be hard put to handle this sort of strain, however. With 25 users, a 100Mbps shared backbone would not be able to deliver the necessary resources. Thus, scalable backbones will be needed.

Bear in mind that the backbone network needs to furnish more than just bandwidth alone. When multimedia applications involve some real-time components, the backbone must be able to furnish continuous, low-latency services either via permanent or

Figure 3: Bandwidth Rising

It's not likely that the networked multimedia applications now arriving will push high-speed LAN technology to the desktop; 10Base-T should be able to handle most video services in the 1- to 2Mbps range.

Analog phone — Digital videophone — Digital videoconferencing — Integrated videoconferencing — Desktop videoconferencing — Digital video playback — LAN TV — Visualisation

1Kbps — 10Kbps — 100Kbps — 1Mbps — 10Mbps — 100Mbps

Compressed bandwidth

HP LaserJet's connectivity lets you by-pass bottle-necks so that you can double productivity

Supports all major operating systems

Increased speed

Location flexibility

Plug and play

Now you can print documents twice as fast as before. HP LaserJet network-ready printers let you by-pass the parallel interface bottlenecks and work close to full network speed. You have the freedom of being able to print from anywhere to anywhere without the need for dedicated print servers or attaching your printer to the file server.
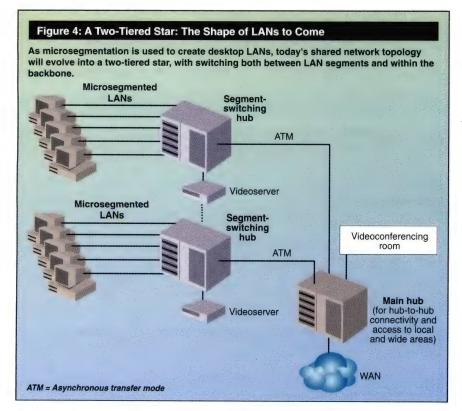
No other printer company comes close to matching HP for connectivity options. One of the reasons for this advantage is the HP JetDirect card - which can also be fitted to most existing HP printers.

Of course as well as this connectivity advantage, you also get the usual added benefits you've come to expect from HP's LaserJet range - superior print quality, software compatibility, and reliability.

For information on HP LaserJet network-ready printers, or HP JetDirect cards for your existing HP printers, phone 13 13 47 or see your nearest HP dealer.

HEWLETT PACKARD

A Better Way.

Figure 4: A Two-Tiered Star: The Shape of LANs to Come

As microsegmentation is used to create desktop LANs, today's shared network topology will evolve into a two-tiered star, with switching both between LAN segments and within the backbone.

Microsegmented LANs

Segment-switching hub

ATM

Videoserver

Microsegmented LANs

Segment-switching hub

ATM

Videoserver

Videoconferencing room

Main hub
(for hub-to-hub connectivity and access to local and wide areas)

WAN

ATM = Asynchronous transfer mode

switched virtual circuits. Specifically, the backbone should be able to ensure an end-to-end latency of roughly 325 milliseconds (the access time for a CD-ROM). Together, the combination of low latency and scalable bandwidth indicates that a switched LAN technology and ATM will be needed in the backbone and that switched Ethernet or Token Ring will be needed in the equipment closet. The latter could be furnished by the Etherswitch from Santa Clara firm Kalpana or with intelligent hubs from Alantec, Bytex, or similar suppliers.

Note that there's little or no call for routers on this two-tiered star. The reason is simple: Routers can add as much as 1800 microseconds of latency to a packet. Further, the format of most packetised video is incompatible with the standard data communications protocols used by routers.

If one of the applications detailed above turns out to be far more popular than now appears likely (on the order of thousands of simultaneous users), the backbone will have to deliver correspondingly lower latencies and higher bandwidth. This will tax two-tiered stars but, if ATM is used on the backbone, the architecture should be able to supply whatever is needed.

There is some question, though, as to whether a killer application has the potential to force ATM or 100Mbps Ethernet or FDDI all the way to the desktop. The answer, for now, appears to be 'No.' It's far more likely that breakthroughs in compression technology will be able to bring the requisite bandwidth to the desktop at a far lower cost than broadband networking technology.

It's important to remember that video-servers are built on PC platforms whose prices will most likely continue to plummet. It may actually be less costly to distribute servers to every workgroup than to build an ATM network. Beyond that, switched Ethernet may also eliminate the need for ATM. Ethernet switches are readily available, cost less than their ATM counterparts, and can be integrated more tightly with hubs. They also provide low latency. Their chief drawback is that they don't scale well beyond seven switches.

Meanwhile, ATM switch manufacturers are looking to add compression algorithms to their boxes. If they are successful, they'll be able to deliver virtual local area networks to users. These will drastically simplify management by creating broadcast groups whose members can be located anywhere on a campus.

Wide Angle Video

Desktop video will make higher-speed, low-cost wide area network services even more critical. It's true that telecommunications carriers around the world have been pushing ahead with broadband ISDN plans, but deployment is proceeding quite slowly. It's questionable whether these carriers will be able to offer MAN-type (10Mbps and faster) service on a national basis before the late 1990s, so the WAN will remain a bottleneck for some time to come.

Why the concern with the wide area — especially when video enterprise networks are in their infancy? The answer lies in the changing social and economic fabric of

society. On average, a *Fortune* 1000 firm in the US has 234 sites, 54% of which have less than 20 employees.

In effect, business is becoming increasingly decentralised. Multimedia promises to revolutionise the collaborative efforts of users on a network, and the enterprise video architecture detailed here can help bring that promise to fruition. Without cost-effective, high speed wide area network services, though, wide area collaborations remain out of reach.

Given these considerations, multimedia networks will largely remain a local affair for the next two to three years. At the same time, it's clear that the greatest benefits of multimedia networks will be realised when they can be cost-effectively deployed across the wide area. The greatest challenges (and the biggest opportunities) in multimedia will be in closing the gap between current constraints and unrealised potential. Without doubt, the search for advanced compression technologies will be key to this struggle.

Advice to Network Managers

When it comes to multimedia networks, staying ahead of the users is the only way to stay ahead of the game. Network managers should be canvassing business unit leaders and customers to determine if they need multimedia support now or in the near future. If they do, the way to begin is by documenting requirements and setting up a multimedia networking lab.

Begin the shift to a two-tier star topology at the earliest opportunity. If the company is moving or opening a new site, that's the time to plan and implement a microsegmented architecture. This means purchasing a hub whose chassis can support a LAN segment per desktop, and choosing 10Base-T as a standard. This is the lowest-cost cabling available that will handle multimedia, and 100Mbps Ethernet will use the same wiring and interface. The vertical wiring running through the building risers should be fibre optic; 62.5/125 micron is the best choice.

Choose a hub vendor that can be a strategic partner, and push it for full disclosures on switched Ethernet and ATM strategies. When evaluating hub vendors, pay careful attention to how easy they make it to move from a LAN-based backplane to one based on switching.

Try to find a videoconferencing vendor to assist with system integration for the entire enterprise video network. Picturetel, CLI, BT and similar firms have the financial resources and experience needed to put all the pieces together, and there are many pieces in a full-fledged video network.

Nick Lippis is the President of Strategic Networks Consulting, a Massachusetts-based firm specialising in enterprise networking.

LAN²LAN internetworking.

Kevin Tolly, John Curtis
and Eric Hindin

What's Missing From Your LAN Analyser?

Flashy features are fine, but the findings of the latest round of Data Comm Lab Tests suggest that LAN analyser vendors would do well to pay more attention to basic features and functions.
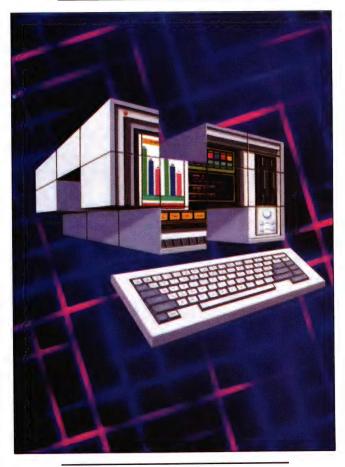
Vendors of LAN analysers are quick to dazzle prospective customers with their products' flashiest features and functions. And network managers can hardly be blamed for getting all starry-eyed over distributed architectures that let them visit remote sites without leaving the office or artificial intelligence packages that put the collective IQ of the Manhattan Project to work solving their problems. But in the glamour and glitter, something vital is left unsaid. All the bells and whistles in the world won't do net managers any good if their analysers can't handle rudimentary troubleshooting or get to the root of everyday problems.

It's not that vendors have ignored the need for basic features and functions, but very few of them actually supply the full complement. One product, for instance, may excel at monitoring, while its analytic abilities have obviously received less attention. Another may be a wizard when it comes to generating frames but falls on its face when it comes to summarising network activity. All this, of course, can make choosing a product a perilous undertaking. And that's why the Data Comm Test Lab has taken a radically different approach to its latest round of product evaluations.

This time out, the Lab's first job was to define the basic functions that every LAN analyser should deliver: Network monitoring, capture/decode, and traffic generation. Each general category actually consists of a number of individual features and functions, all of which have been assigned different weights to reflect the Lab's view of their importance to users. Thus, the overall scores of the 10 Ethernet and Token Ring analysers tested are a compostite of many factors. The Lab also defined the elements that go into a well-designed user interface and then rated each product accordingly. Many net managers will only turn to LAN analysers when there's been a malfunction: That's hardly the time to discover that using a product is a job for a seasoned cryptographer.

Finally, the Lab identified the three basic groups of LAN analyser users — help desk personnel, troubleshooters, and product engineers — and then rated boxes according to how well they matched various job requirements. (Here again, a scale of weighted values was used to determine an overall score.)

With all the data sorted, the numbers tallied, and the results double-checked, the Lab found that two products delivered all the core capabilities needed to be rated 'Excellent' for all users: The Network Advisor from Hewlett-Packard and the Foundation Manager from Protools. They have both been honored with Tester's Choice awards. Joining this pair is the LANdecoder suite of tools from Triticom. Although it wasn't a top scorer across the board,

Triticom's offering is particularly noteworthy for its price/performance. Network managers looking for LAN analysers would do well to start with these three, but careful attention should be paid to the leading products in each of the three users categories.

In this, its second test of LAN analysers, the Lab looked only at products that handle both Ethernet and Token Ring (see Table 1). It also only tested products that run on portable computers, since users typically have to travel to trouble spots. This criterion ruled

Table 1: Looking at LAN Analysers

VENDOR	PRODUCT	RELEASE	TOKEN RING CHIP SET	TOKEN RING DOWNLOAD	CPU	SPEED	BUS	OPERATING SYSTEM
CXR Digilog INS (02) 906 6335	LANvista	2.09	TI TMS380	TI Mac	80386	20MHz	ISA	DOS
FTP Software Network Solutions (02) 415 0500	LANwatch for DOS	3.0	TI TMS380	TI Mac	80386	33MHz	ISA	DOS
Hewlett-Packard (008) 033 821	Network Adviser	A.03.00	TI TMS380, proprietary	TI MAC, proprietary	80486	33MHz	ISA	Proprietary
Intel (02) 975 3300	Netsight Professional	1.33b	TI TMS380	TI, Olicom USA	80486	25MHz	ISA	DOS
Network General (02) 716 8151	Expert Sniffer	4.03	IBM pre-Tropic	N/A	80486	33MHz	EISA	DOS
Novell Com Tech (02) 317 3088 Datamatic (02) 449 8133	LANalyser	3.11A	TI TMS380	TI Mac	80386	33MHz	ISA	DOS
Protools Ungermann- Bass (03) 696 2006	Foundation Manager	1.21	TI TMS380	TI Turbomac	80486	50MHz	EISA	OS/2
Telecommunications Techniques Vicom Australia (03) 690 9399	Netlens 3000	1.2	TI TMS380	TI Mac	80486	33MHz	EISA	DOS
Triticom New Wave Technology (02) 817 2333	LANdecoder	*	TI TMS380	TI Turbomac	80486	33MHz	ISA	DOS
Wandel & Goltermann (03) 690 6700	DA-30	3.2	TI TMS380	Madge Networks, Fastmac	80386	25MHz	Prop.	Proprietary

* The Triticom suite of products includes LANdecoder for Ethernet for Token Ring 1.10A, Ethervision 2.12 and Tokenvision 2.20b.
EISA = Extended Industry Standard Architecture   ISA = Industry Standard Architecture

out analysers that run in smart hubs or Unix workstations.

The Long and Winding Road

Before taking a look at performance and ratings, something needs to be said about how the analyser industry reached its present state of affairs. First off, the Lab is not suggesting that vendors set out to shortchange users when it comes to basic functions. Rather, the products tested seem to have evolved in accordance with very different visions. Thus, some products furnish advanced artificial intelligence software to help diagnose problems; others make it possible to monitor two LANs concurrently. Unfortunately, such noteworthy achievements have been made at the cost of basic features and functions. If a user's needs happen to match a vendor's vision, there may well be no trouble. But most users have very broad needs; almost inevitably, the narrow focus taken by manufacturers is going to cause problems.

Further, the almost universal lack of standards in the LAN analyser market has confused matters even more. For contrast, consider SNA gateways, which can rely on SNA itself as a guide to essential functions. Similarly, bridges based on source routing or spanning tree must deliver a basic set of services simply to qualify as acceptable products. Until such core criteria exist for

LAN analysers, vendors will remain free to pursue their own ends — with predictable results. Perhaps the functions outlined by the Test Lab can serve as the groundwork for these much-needed core criteria.

Monitoring

Monitoring is one of the basic tasks of any LAN analyser: Keeping tabs on LAN traffic, determining which protocols are present, counting errors, and reporting all findings to users in statistical form. With an analyser listening in, it should be possible to establish how many frames are crossing a network each second and the types and sizes of frames present — which is invaluable information when trying to track down the cause of degraded performance or detect unauthorised usage.

To gauge how well analysers can perform this essential task, the Lab defined eight categories that taken together indicate an analyser's ability to monitor traffic successfully (see Table 2). Two of the most important categories (weighted 15% each) reflect how accurately an analyser reports frame rates on Token Ring and Ethernet. Clearly, if a product can't count, it will be of little use. Any analyser off by 40% or more scored a zero for accuracy; a rating of 10 indicates that the count was off by less than 0.5%. A rating of 5 means the count was off by 19.5% to 20.5%.

By and large, Token Ring LANs proved troublesome for many boxes. As long as the LAN was only moderately loaded and used common-sized frames, tests went fairly smoothly. (A full description of the test methodology is presented later.) As frame rates increased, though, anomalous behaviour was noted. One analyser, the LANwatch for DOS from FTP Software, ignored frames above a certain size. Another, the LANvista from CXR Digilog, often del-

Table 2: Frame Monitoring

FUNCTION	TOKEN RING ACCURACY
Weight	15%
Hewlett-Packard	9.1
Protools	8.0
Intel	8.0
Triticom	9.0
Wandel & Goltermann	10.0
Network General	7.8
Novell	3.6
CXR Digilog	6.2
TTC	4.3
FTP Software	3.6

ivered inflated counts, while the Netlens from Telecommunications Techniques and the LANalyzer from Novell reported fewer frames than actually were present.

What's more, at high frame rates (5,000 frames per second) only the DA-30 from Wandel & Goltermann warned that it could not capture the entire frame, although it still kept an accurate count. None of the other analysers indicated any problem, even though a missed-frame indicator is built into the Token Ring chip sets. In fact, the only other analyser with this sort of indicator, CXR Digilog's LANvista, gave no sign that anything was wrong.

Overall, the analysers did a better job when it came to counting popular-sized frames at moderate rates on Ethernet. Better yet, product performance did not degrade as much as frame rates increased and larger frames were sent onto the network. Hewlett-Packard's Network Advisor earned scores of 9.1 and 10, respectively, for Token Ring and Ethernet. The Protools Foundation Manager earned 8.0 for Token Ring accuracy and tied with HP with a 10 for Ethernet. W&G's DA-30 turned in a perfect 10 for both technologies. In fact, more than half the analysers earned 10s for Ethernet.

Get Real

The most important monitoring function is real-time counting (weighted 25%), which lets network managers view traffic as it travels. The Lab identified three sub-categories: Types of counters, types of reports, and station lists, each of which was further divided. For instance, when checking types of counters, the Lab looked to see if frames, bytes, and network utilisation were provided. Scores in this category were determined by comparing the total counters offered against the theoretical maximum. Points also were awarded for simultaneously displaying related statistics, as well as for graphics and clarity.

Non-real-time counting (weighted by us at 15%) tracks traffic over time. It can be used to reveal trends or the beginnings of faults. Most important is the ability to export data to external databases or spreadsheets. Protools, which took the top slot in this category, can ship data out to the Microsoft Windows Dynamic Data Exchange (DDE) protocol, supported by most spreadsheets and many database management systems (DBMSs). No vendor supplied a standard SQL interface, a big shortcoming.

Runts and Giants

The abilities to monitor Token Ring and Ethernet data were each weighted at 10% of the total score for monitoring. The Lab defined six categories of Token Ring data, each with subcategories. For example, the frame type category was broken down into 12 subcategories, including whether Broadcast and Active Monitor Present frames could be detected. Fewer Ethernet-specific categories were created, since Ethernet does not define associated functions such as network management. The Lab established six Ethernet-specific conditions, including 'runts' (any frame smaller than the 32-byte minimum), collisions and 'giants' (any frame larger than 1514-byte maximum). HP's Network Advisor took the top spot for Token Ring, with a score of 8.5; the high scorer for Ethernet was Novell's LANalyzer, with 7.5. A number of vendors earned a 7 for this category.

Frame filtering (weighted at 5%) allows an analyser to count only those frames a user is interested in. The Lab looked for nine filtering criteria, among them frame size, good packets, bad packets, protocols and user-defined byte sequences. Finally, alarms are a simple but vital aspect of monitoring (weighted at 5%). A LAN analyser should be able to sound an audible alarm based on different conditions; the greater the number of alarms and the more they can be configured, the higher the score.

Novell's LANalyzer and the Triticom LANdecoder did the best in this category, with scores of 7.5 and 6.5, respectively. The LANvista does not allow any alarms to be set, a troubling omission by its maker.

Capture/Decode

The ability to grab a frame off a network and display its contents in English is key to troubleshooting and advanced diagnostics. The Test Lab defined six categories under the general heading of capture/decode (see Table 3). Support for the 12 protocols commonly found on corporate networks — including TCP/IP, DECnet, SNA, IPX/SPX, AppleTalk, Vines, and OSI — was deemed the most important aspect of this overall function (weighted 35%). Most networks operate with a healthy mix of protocols; thus, the higher the score, the greater the support. It's important to note that these scores reflect vendor claims that the Lab did not try to substantiate (a full-time job in and of itself). The Expert Sniffer from Network General and the Netsight Professional from Intel, together with the LANalyzer from Novell and Triticom's LANdecoder all earned 10s; LANvista from CXR Digilog and Telecommunications Techniques' Netlens also did well, scoring 9.2.

The actual decoding capabilities of an analyser were judged to be almost as important (weighted 30%). These make it possible to analyse the frames on a network, accurately translate the contents of a frame into English, and store the information in a file. Intel's Netsight Professional and Triticom's LANdecoder earned 10s; Network General's Expert Sniffer was awarded a 9.

For display (weighted 15%), scores depended on the presence or absence of various abilities — decoding both ASCII and EBCDIC, for instance, or switching layers of the protocol stack on and off. Filters (weighted at 10%) allow network managers to pull desired frames off a network. The

ETHERNET ACCURACY	REAL-TIME COUNTS	NON-REAL-TIME COUNTS	TOKEN RING SPECIFIC DATA	ETHERNET SPECIFIC DATA	FRAME FILTERING	ALARMS	COMPOSITE SCORE
15%	25%	15%	10%	10%	5%	5%	
10.0	7.5	9.0	8.5	5.0	7.0	3.0	7.9
10.0	8.0	9.0	5.0	7.0	5.5	8.0	7.9
10.0	8.5	6.0	6.5	7.0	7.0	7.5	7.8
10.0	8.5	6.0	4.5	7.0	3.0	6.5	7.5
10.0	7.0	6.0	4.0	5.0	2.0	4.5	6.8
10.0	5.5	6.0	5.5	5.0	7.0	6.0	6.6
9.9	6.0	6.0	4.5	7.5	5.0	9.0	6.3
9.0	6.5	6.0	3.5	6.0	4.0	0	5.9
10.0	4.0	5.5	3.0	4.0	4.0	6.0	5.1
6.0	3.0	3.0	3.0	4.5	4.0	1.0	3.6

Vendor Profiles

CXR Digilog

LANvista is a general-purpose LAN analyser designed from the ground up with a distributed architecture. A single LANvista consists of a master (the PC running the program) and a slave (the adaptor that captures and generates traffic). The slave can be located in the same PC as the master or in any other PC on the network. Most of the other LAN analysers that feature distributed capabilities do so via add-on software. Distributed in Australia by Information Network Solutions, LANvista consists of software and adaptors for a PC.

FTP Software

Distributed by Network Solutions, LANwatch is a no-frills tool with a user interface only an engineer or software developer could put up with. Instead of menus, commands are entered one character at a time. The only graphing functions are performed with strings of characters on screen. Perhaps because of its Ethernet origins, LANwatch is still weak in Token Ring and cannot yet handle packets above 2Kbytes. The analyser consists of PC software.

Hewlett-Packard

The Network Advisor is a high-end unit that puts its colour capabilities to good work interpreting data. For instance, it displays colour-coded VU meters to indicate the severity of an error condition. The Advisor incorporates an expert system to assist users in making sense of network conditions, although the AI package is now limited to a few protocols. (The Lab was unable to test this feature.) The graphical user interface that comes standard with the product closely resembles Microsoft's Windows.

Intel

The Netsight Professional is a midrange product with excellent monitoring capabilities (including the capacity to display simultaneously a wide range of statistics). The product virtually requires a colour screen, since different colours are used to identify elements of the protocols being decoded. This could be a problem for a user who wishes to run Netsight on a laptop. Intel's documentation is top-notch and includes a hand-book for most common protocols.

Network General

Network General is a market leader in the LAN analyser industry. Like HP, the company is interested in presenting and interpreting data, as its AI-assisted Expert Sniffer bears out. (The AI software is restricted to a very limited number of protocols — another way that Network General resembles HP.) The Expert Sniffer makes it easy to open multiple windows that reveal different portions of captured data in a variety of ways. Users can, for instance, elect to view a summary decode, detailed decode, and a hex dump all at the same time. The Expert sniffer is sold either as a turnkey product or as software and adaptors for a PC.

Novell

Distributed in Australia by Com Tech and Datamatic the LANalyzer is a general-purpose analyser that boasts a wide selection of alarms and monitoring functions. Alarms can be set on just about any criteria, but applications are task-specific, which can make it difficult to navigate if users don't know exactly what they want to find and where to find it. The LANalyzer is sold as software for a PC.

Protools

The vendor sees its Foundation Manager as more network management tool than conventional LAN analyser. It can be used in conjunction with Protools' remote probes and other products. The Foundation Manager is supplied with an object-oriented interface. Users pick up icons representing functions and place them on a path relative to other objects to initiate actions. While most PC-based analysers use DOS or proprietary enhancements to DOS in order to accomplish functions like multitasking, Foundation Manager runs under OS/2. Although it is compatible with OS/2 2.0, it's actually a 16-bit OS/2 1.3 application. Foundation Manager is packaged as software and is distributed in Australia by Ungermann-Bass.

Telecommunications Techniques

TTC's Netlens is difficult to use, thanks in part to the almost incomprehensible commands employed with the user interface. The product makes possible background capture and monitoring by offloading functions onto a proprietary LAN adaptor, effectively freeing up the PC while capture is ongoing. Other LAN analysers accommodate multitasking via software, which may mean less than optimal performance when background operations are performed. The product is packaged in a variety of formats, from software and adaptors to complete platforms. Netlens is available in Australia through Vicom.

Triticom

Distributed in Australia by New Wave Technology, the Triticom suite of products delivers solid performance at a good price, and the vendor's interface was the one of the best of any evaluated. According to the product literature, over 50 Token Ring adaptors are supported, so Triticom's LAN analysers can be used on almost any PC imaginable. Other products that perform as well (and Triticom's monitoring accuracy was significantly better than that of many more expensive analysers) often require proprietary adaptor cards. Triticom's analysers are sold as software; the Token Ring and Ethernet monitoring and decoding products are sold separately.

Wandel & Goltermann

The DA-30 offers the most advanced capabilities of any product tested and is intended to furnish virtually any function the most demanding user could want. It supports FDDI, features a proprietary seven-layer programming language, boasts on-board adaptor processing (as opposed to one CPU servicing multiple interfaces), and delivers unequalled accuracy and reliability. The analyser also performs simultaneous LAN and WAN analysis. The DA-30 is sold as a turnkey solution with a single adaptor/analyser. Additional analyser modules are available for a wealth of topologies.

Lab scored the participants on a total of seven types of filters. Protools' Foundation Manager was the leader, with a score of 9.

Triggers let network managers start and stop captures at the occurrence of particular events (such as a predefined network-utilisation threshold) or at specified times. The Lab has defined five essential triggers, but only Novell's LANalyzer managed to offer all of them.

Finally, capture/import (weighted 5%) gives net managers a way to work with files captured by another analyser. This ability could prove very useful for consultants with multiple clients or communications professionals whose companies are taken over by a parent that uses different analysers. A bit surprisingly, Triticom's LANdecoder is the only box to offer this feature.

Suitable for Framing

By generating frames and sending them out onto a network, LAN analysers make it possible to see the effects of increased traffic and to stress test bridges, routers and servers. Frame generation is particularly important when it comes to running 'what if' scenarios to try and determine if a network has the capacity to support new users and applications.

The Lab defined six subgroups within the general function, each weighted according to importance to users (see Table 4). The ability to generate multiple types of frames is essential to accurately simulating real network traffic (and was thus weighted at 40%). If a vendor could generate only one type of frame, it was awarded one point. If it could generate 10 frames, it was awarded a 5. The ability to generate 100 frames in succession earned 10 points, a capability exhibited only by the Wandel & Goltermann DA-30 and the Protools Foundation Manager.

Frame configuration gives users of LAN analysers a great deal of flexibility in deciding what types of frames to generate or under what conditions (for instance, generate frame X and Y% network utilisation is achieved). The greater the LAN analyser's abilities in this area, the more points awarded (frame configuration was weighted at 20%). HP's Network Advisor took the lead here, scoring a 9, followed closely by the W&G DA-30 and Novell's LANalyzer (both of which scored 8).

Generation Gap

Ethernet and Token Ring performance were not weighted very highly when it came to frame generation (15% each); after all, not that many users will need to blast frames onto the network at a high rate. Still, it should be noted that Token Ring performance was so poor in general that the requirements of most users are not likely to be met. W&G's DA-30 (which scored a 9.6) and HP's Network Advisor (8) are the chief exceptions here. Just as bad, some of the

Table 3: Capture/Decode

FUNCTION	PROTOCOL SUPPORT	DECODING SKILLS	DISPLAY	FILTERING	TRIGGERING	CAPTURE/ IMPORT	COMPOSITE SCORE
Weight	35%	30%	15%	10%	5%	5%	
Network General	10.0	9.0	9.0	8.0	6.0	0	8.6
Intel	10.0	10.0	8.0	5.0	8.0	0	8.6
Novell	10.0	9.0	6.0	6.5	10.0	0	8.2
Protools	8.3	8.0	9.0	9.0	8.0	0	7.9
Hewlett-Packard	8.3	8.0	9.0	7.0	3.0	0	7.5
CXR Digilog	9.2	7.0	6.0	7.0	8.0	0	7.3
TTC	9.2	7.0	6.0	5.0	8.0	0	7.1
Wandel & Goltermann	7.5	6.0	9.0	7.0	8.0	0	6.8
Triticom	3.3	10.0	5.5	5.0	4.0	8.0	6.0
FTP Software	7.5	7.0	5.0	2.0	5.0	0	5.9

products tested misrepresented the number of Token Ring frames being generated. The Lab measured a LAN analyser's ability to generate a specific frame rate (usually at 100% of absolute bandwidth) and awarded points based on the number of frames generated each second. The Lab's ideal frame rate for 64-byte frames on 16Mbps was 20% of 16Mbps, or 6,240 frames per second.

Once again, Ethernet performance was better, with three boxes scoring close to 10: Wandel & Goltermann's DA-30, Hewlett-Packard's Network Advisor and Triticom's LANdecoder.

The ability of a LAN analyser to capture frames while generating traffic can be helpful in establishing a full performance picture (weighted 5%). A score of 10 indicated that a product met all the criteria established by the Lab, a feat managed by HP's Network Advisor and Novell's LANalyzer. These criteria included whether the analyser could simultaneously capture and generate frames or merely monitor network activity.

CXR Digilog's LANvista was awarded a 7.5 because it requires a second slave adaptor to simultaneously capture and generate frames.

Finally, some LAN analysers can use previously captured frames as the basis for generating traffic (playback capture, weighted 5%). This is a handy feature for managers who want to know, for example, how a network would respond if the number of users running the same applications were doubled. A score of 10 indicates that a LAN analyser could play back anything captured, something only Wandel & Goltermann's DA-30 accomplished. LAN analysers that allow partial playback capture are more common, but these devices can't generate illegal MAC frames to test networks.

Protools Foundation Manager, Novell's LANalyzer, CXR Digilog's LANvista, Network General's Expert Sniffer and Intel's Netsight Professional all offer partial playback capture. Telecommunications Technique's Netlens 300 scored 1 because even

though it can capture anything, it repeatedly plays back only one frame from the file.
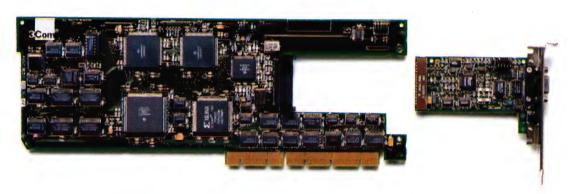
User Interface

LAN analysers are tools that most net managers will turn to at times of crisis: That makes a well-designed user interface crucial. Further, the user interface can often be taken as a sign of a vendor's commitment to overall quality. It's easy to gloss over shortcomings rather than delay shipment; vendors willing to wait until everything is A-Okay thus get high marks.

Interfaces were scored on five criteria (see Table 5). On-screen presentation assesses the overall quality of the interface (weighted 60%): Will network managers be able to readily see what actions they are performing and how to terminate procedures or switch tasks? Are graphs clearly labelled? Most products have fairly crude menu-based interfaces that require users to work very hard to get anything done. Network General's Expert Sniffer, which scor-

Table 4: Frame Generation

FUNCTION	MULTIPLE FRAMES	FRAME CONFIGURATION	TOKEN RING PERFORMANCE	ETHERNET PERFORMANCE	MONITOR/CAPTURE/ GENERATE	PLAYBACK CAPTURE	COMPOSITE SCORE
Weight	40%	20%	15%	15%	5%	5%	
Wandel & Goltermann	10.0	8.0	9.6	9.9	7.5	10.0	9.4
Hewlett- Packard	7.5	9.0	8.6	9.8	10.0	5.0	8.3
Protools	5.0	7.0	7.9	8.9	8.5	7.0	6.6
Novell	6.0	8.0	2.9	8.5	10.0	7.0	6.5
Network General	5.0	5.0	2.9	8.9	0	7.0	5.1
Triticom	1.0	4.0	8.0	9.6	0	0	3.8
CXR Digilog	1.0	6.0	1.1	7.2	7.5	7.0	3.5
TTC	1.0	7.0	3.0	6.6	0	1.0	3.2
Intel	1.0	4.5	3.3	6.0	0	7.0	3.1
FTP Software	0	0	0	0	0	0	0

Table 5: User Interface

FUNCTION	PRESENTATION	INTUITIVE ORGANISATION	WARN BEFORE ACTION	INTERNAL CONSISTENCY	ON-LINE HELP	COMPOSITE SCORE
Weight	60%	20%	10%	5%	5%	
Network General	9.0	8.5	6.0	9.0	6.0	8.4
Protools	8.5	6.0	4.0	8.0	10.0	7.6
Triticom	8.0	9.0	0	8.0	0	7.0
Hewlett-Packard	8.0	6.0	0	8.0	9.0	6.8
Wandel & Goltermann	7.0	5.5	9.0	7.0	6.0	6.8
Intel	7.5	6.0	0	4.0	4.0	6.1
CXR Digilog	5.0	2.5	5.0	6.0	7.5	4.6
Novell	5.0	4.0	1.0	6.0	6.0	4.5
TTC	4.0	2.0	1.0	2.0	0	3.0
FTP Software	2.0	1.5	0	5.0	3.0	1.9

ed a 9, is the chief exception. The higher the score, the less work that is needed to use the interface.

Intuitive organisation (which we accorded a 20% weighting) means that the functions and choices presented to users are the one they'd be most likely to want at a specific point.

For instance, Triticom's LANdecoder presents users with only two choices for frame generation: Edit the frame or generate traffic. LAN analysers that warn users before taking a selected action (weighted 10%) can help cut down on some of the stress inherent in disaster recovery. After all, the last thing users need is to have to recover from their own actions while trying to get their networks up and running. The more warning messages a LAN analyser provided, the higher the score it received. At the least, an analyser should tell users

they're about to erase a captured file or let them know that proceeding with traffic generation at the specified rate could bring the network down. Several analysers offered no warnings at all.

Internal consistency (weighted 5%) simply means using the same keys from screen to screen, which should be a no-brainer. Unfortunately, some analysers are clearly the handiwork of different programmers, and no attempts have been made to ensure consistency: Thus, the ESC key is used to return to an earlier menu on some screens, while the page-down key performs the same task on others.

As strange as it seems, two of the analysers offer no on-line help and were accordingly awarded zeros — Triticom and Telecommunications Technologies. Points were awarded to the other analysers based on how helpful their help is.

Before Buying a Box

Looking only at features and functions is a shortsighted way of choosing networking gear (although that approach is, by far, the most common). It's just as important to match what a product does with who is going to work with it. To that end, the Lab has divided the LAN analyser user community into three broad categories — help desk personnel, trouble-shooters and network/product engineers — and then rated each box according to how well it meets different overall job requirements (see Table 6). Once again, a weighted scale was used; that makes it possible to reassign values as the importance of features changes in relation to specific needs.

Help desk personnel generally sit in network operations centres and interpret events, monitor traffic loads, detect subtle

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Table 6: The Best Boxes

FUNCTION	HELP DESK PERSONNEL	TROUBLESHOOTER	NETWORK/PRODUCT ENGINEER
CXR Digilog	Good	Good	Good
FTP Software	Fair	Fair	Fair
Hewlett-Packard	Excellent	Excellent	Excellent
Intel	Excellent	Good	Good
Network General	Excellent	Excellent	Good
Novell	Good	Good	Good
Protools	Excellent	Excellent	Excellent
TTC	Good	Good	Good
Triticom	Good	Good	Good
Wandel & Goltermann	Good	Good	Excellent

The Lab then went through all its previous ratings and used the data to determine which products would be likely to best serve each group of users, rating the boxes Excellent (composite score 7.5-10), Good (5-7.4), Fair (2.5-4.9), and Poor (0-2.4). (The scale was used rather than actual composite scores because the Lab feels that slight differences in ratings are not important. Users who wish to determine composite scores for themselves can do so from the data published here).
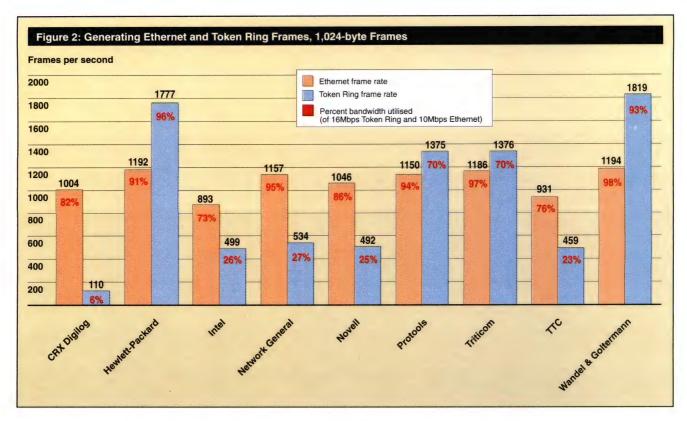
As indicated, only the Network Advisor from Hewlett-Packard and Protools' Foundation Manager were rated 'Excellent' for all three classes of users. It should also be noted that no vendor's product was rated 'Poor' for any group of users.

Of course, price also will affect the ultimate choice of a LAN analyser. Many users are probably willing to settle for a little less in the way of features and functions for a significant price break. But determining price is not a hard science. Some analysers come packaged with a PC; others come as add-in cards and software. More often than not, it's possible to buy a PC for a much lower price than that quoted by a LAN analyser vendor. And some users also will want to consider other attributes, such as hardware requirements or Token Ring chip sets and drivers (see Table 1, again).

anomalies in order to ensure proper operation, and respond to problem reports from users. For these users, the Lab assigned a 50% weight to monitoring, 25% to capture/decode, and 25% to the user interface. No weighting was assigned to frame generation since it's not likely that help desk personnel will need to solve user problems by replicating them. Monitoring was considered most important since observing the network is a primary responsibility for anyone on the help desk, and capture/decode can help get to the root of a problem.

Network troubleshooters may be employed by user organisations or be part of vendor support teams. They usually go to where the problems are and do their best

determine to what went wrong and how to fix it. For troubleshooters, capture/decode was deemed most important and given a 40% weighting; monitoring followed with 30%; frame generation was weighted 10%; and the user interface accounted for 20% of the overall score.

The third user group defined by the Lab includes network and product engineers. These are the folks who actually design networks, build internetworking products, and troubleshoot complex configurations. For them, monitoring, capture/decode, and frame generation were weighted equally at 30%. Since engineers can likely figure out how to use anything, the user interface counted for only 10% of the total score.

Performance Testing

The Lab ran two sets of performance tests as part of its evaluation. The first determined how accurately a LAN analyser could count frames. The second test assessed how

Figure 1: Counting Token Ring and Ethernet Frames, 1,024-byte Frames

Figure 2: Generating Ethernet and Token Ring Frames, 1,024-byte Frames

Frames per second

Legend:
- Ethernet frame rate
- Token Ring frame rate
- Percent bandwidth utilised (of 16Mbps Token Ring and 10Mbps Ethernet)

Analyser	Ethernet frame rate	Ethernet %	Token Ring frame rate	Token Ring %
CRX Digilog	1004	82%	110	6%
Hewlett-Packard	1192	91%	1777	96%
Intel	893	73%	499	26%
Network General	1157	95%	534	27%
Novell	1046	86%	492	25%
Protools	1150	94%	1375	70%
Triticom	1186	97%	1376	70%
TTC	931	76%	459	23%
Wandel & Goltermann	1194	98%	1819	93%

many frames an analyser could generate. Each analyser's performance in these areas counted 15% toward its overall score for monitoring.

To test the first capability, a local area network analyser was connected either to a 16Mbps Token Ring LAN built with shielded twisted-pair (STP) wiring or to a 10Base-T Ethernet and set to count frames on the network. In each topology case, a known number of frames was generated and the analyser's total compared with this figure. For Token Ring tests, frames were created and sent onto the network by a frame generator calibrated by a W&G DA-30 and an ATS-1000 analyser from Bytex. For the Ethernet tests, frames were generated by a W&G DA-30.

The Lab used the same Token Ring and Ethernet LANs when testing frame generation. Each LAN analyser was set to generate frames at its highest possible rate, and a DA-30 was used to count the actual number of frames sent onto the network. If any discrepancy between the number of frames the DA-30 counted and the number the analyser under test said it was generating, additional analysers were added to the test bed to corroborate the count.

Agonising Reappraisals

To accurately assess each LAN Analyser's abilities under all conditions, the Lab ran all tests a number of times while changing such variables as frame size and rate. For Token Ring, the Lab ran frame-counting tests with 64-, 1,024-, 2,048- and 4,096-byte frames. The smallest frames were sent onto the net-

work at 1,990 and 4,980 frames per second (fps), representing bandwidth utilisation of 6.4% and 15.9% respectively. The 1,024-byte frames were sent at 496 fps for 25.4% bandwidth utilisation; 2,048 byte frames were sent at 745 fps for 76.3% bandwidth utilisation, and 4,096-byte frames were sent at 430 fps for 88.1% utilisation.

For Ethernet tests, 64-byte frames were sent at 1994 and 4,960 fps, representing 10.2% and 25.4% bandwidth utilisation; 1,024-byte frames were sent at 502 fps for 41.1% utilisation. The Token Ring frame generation tests were repeated with 64-, 1,024-, 2,048- and 4,096-byte frames, as well as with the largest frames the analyser under test could deliver.

All of the foregoing sizes, speeds, and loads can be considered as typical for corporate networks: 64-byte frames, for example, are commonly used for terminal emulation and acknowledgments; 1,024-byte frames are ideal for file transfers.

When it came to counting 1,024-byte frames on Token Ring and Ethernet, most of the analysers proved up to the job (see Figure 1). (Normal fluctuations make it impossible for each LAN analyser to be presented with exactly the same number of frames; the actual number of frames sent and the number counted are both listed.)

Performance wasn't nearly as satisfactory when other frame sizes and rates were used — counts routinely were off by several thousand frames per second. In general, the lower the frame rate and smaller the frame size, the better the LAN analyser did. Unfortunately, all of the frames used in the tests
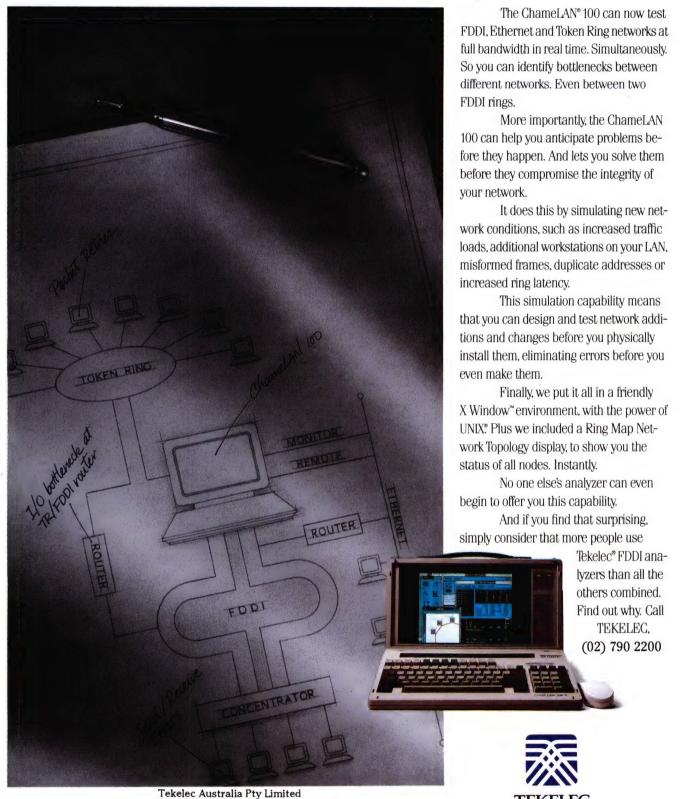
are likely to be found on malfunctioning networks. Worse, with the exception of the W&G DA-30, none of the LAN analysers evaluated gave any indication that frames were being dropped. This problem is all the more mysterious when it's understood that implementing a lost frame indicator simply means querying the Token Ring adaptor to see if it is losing frames.

The results were even more erratic when it came to generating 1,024-byte frames (see Figure 2). The key statistic here is the percentage of bandwidth the LAN analysers were able to utilise. In the Ethernet tests, most were able to reach at least 80%, and several broke 90% utilisation. The utilisation for Token Ring fell far short of these marks, though.

Worse, since the 16Mbps Token Ring LAN used by the Lab theoretically delivers 60% more bandwidth than Ethernet's 10-Mbps, the LAN analysers should have been able to generate Token Ring frames at a higher rate than Ethernet frames. Only Protools, W&G, HP, and Triticom were able to do so. As tests were run with larger frames, Token Ring performance increased. This is as it should be, since larger frames have less overhead associated with frame generation (headers, trailers, and the like do not have to be generated as often).

Kevin Tolly is the Director of the Data Comm Test Lab and President of Interlab. He is based in Sea Girt, New Jersey. Eric Hindin is Senior Technology Editor for Data Communications magazine. John Curtis is a Research Associate at Interlab.

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Desktop TCP/IP — A Flexible Alternative

Providing network access for users in remote locations can often be a difficult and costly exercise. Graeme Le Roux takes a look at how a little imagination and the TCP/IP protocol suite can help.

Have you ever received a simple request from a user, or a small group of users, for network access and discovered that supplying that access is practically or economically impossible? Frustrating isn't it? I find that most requests of this type come from people who don't work with a 'company standard' desktop machine and/or don't work in an large branch office or headquarters site. Most requests from these people are for host access, shared file and print services and, increasingly, electronic mail.

There are several ways to provide such services, but the most mature solutions revolve around the use of the TCP/IP suite. In the sidebars accompanying this article I've given two examples based on PC and Macintosh TCP/IP suite implementations. The TCP/IP suite products I've mentioned here and used in the accompanying examples are from NetManage, ftp and InterCon. This is not a product comparison. My point is to illustrate the possibilities and practicalities of using the TCP/IP suite as an alternative, or an addition, to a 'name brand' network operating system (NOS) and to discuss some of the implications of doing so. All the products I've mentioned here work with all the major NOS vendor's products within their respective environments and are very well behaved with regard to the operating systems for which they are intended.

What is TCP/IP?

Before going any further I should clarify just what I mean by the 'TCP/IP suite.' I am referring to the group of protocols described in the Internet Requests For Comment (RFCs) and the Internet Engineering Notes (IENs) which are often inaccurately referred to as simply 'TCP/IP.' The Transmission Control Protocol (some 22 RFCs) which may be, and usually is, implemented upon the Internet Protocol (about 9 RFCs) represents a small subset of the protocols covered in hundreds of RFCs and IENs. The official name for the TCP/IP suite is 'The TCP/IP Internet Protocol Suite.' The Internet being the worldwide internetwork environment within which these RFCs and IENs were developed. While the Internet is not specifically a standards organisation, RFCs and IENs may be considered in the same light as published international standards, since they are not owned or controlled by any one organisation and the nature and size of the Internet community ensures that compliance is effectively enforced.

The TCP/IP suite has equivalents for all the functions provided by the NOS and some of the applications packages you are probably using now, but there are differences. Most of these differences are a result of the necessities of the Internet environment at the time

the particular standard developed. The Internet started as an ad hoc collection of links between various academic sites in the US. This collection grew into several large networks which then became interconnected with the aid of US Government funding, resulting in a nationwide internet called ARPAnet. In recent times similar networks in Europe and Asia have connected to this network forming the Internet as we know it today. In the US, the Internet is now so big that it uses NSFnet (the National Science Foundation network

Some Uses of NetManage's NetRoute

Network #1: An Ethernet local area network running the TCP/IP suite plus other protocols — for example, IPX/SPX, DECnet, NetBEUI. Company hosts, servers and personal computers supporting SMTP, Telnet, NFS and SNMP.
Network #2: Apple Macintoshes running AppleTalk with Ethernet adaptors installed. InterCon software as follows: Share/NFS including MacTCP; InterPrint; TCP/Connect II (which provides Telnet).
Router: An 80386 PC with two Ethernet adaptors installed running DOS 5.0 and Windows 3.1. NetManage's Chameleon/NFS and NetRoute installed to route between Network #1 and Network #2.

Notes — Apple Macintosh users can send and receive mail from the company mail server via SMTP, access hosts via Telnet, as well as share files with hosts and personal computers via NFS. Both networks can be monitored (and controlled to some degree) via SNMP. They can also use printers attached to servers on Network #1. AppleTalk traffic is restricted to Network #2.
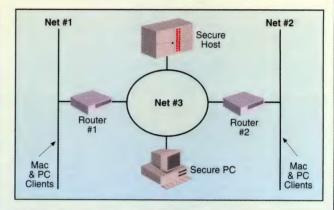
Networks #1 and #2: Departmental Ethernets connecting assorted Macintoshes, DOS and Windows PCs. Macs running InterCon software as follows: Share/NFS including MacTCP; InterPrint; TCP/Connect II (provides Telnet). Windows-based personal computers running NetManage's Chameleon/NFS. DOS PCs running ftp's PC/TCP.
Network #3: Token Ring connecting assorted IBM hosts and PCs which are not running TCP/IP.
Routers #1 and #2: An 80386 PC with one Ethernet adaptor and one Token Ring adaptor installed running DOS 5.0 and Windows 3.1. NetManage's Chameleon/NFS and NetRoute installed to route between Ethernet and Token Ring.

Notes — In this case Network #3 is being used as a transport for IP traffic. As such it is invisible to nodes on Networks #1 and #2. Since they are not running any TCP/IP software, all hosts and PCs on Network #3 are also invisible and inaccessible. NetRoute is providing a cost effective method of allowing a 'secure' system (the IBM hosts and personal computers on Network #3) to remain completely inaccessible to users on Networks #1 and #2 without going to the expense of installing a separate transmission system.
A Token Ring is not particularly well suited to high volumes of small frame size traffic. Telnet is particularly good at generating just this sort of traffic.
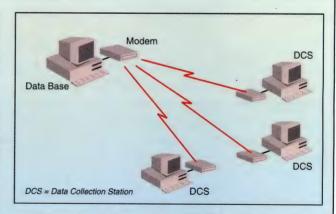
As a result this configuration should only be considered as a low to medium bandwidth solution. If traffic loads on the Ethernets were to justify high bandwidth routers it would be inadvisable to continue to use the Token Ring as described here.

Data Base: An 80386-based PC running Microsoft's DOS 5.0/Windows 3.1 with Chameleon/NFS and NetRoute installed running a dial-up modem. This PC would run an FTP-based application written with the aid of NetManage and, for example, C or Microsoft's Visual Basic. This application would simply use FTP to transfer a data file from each Data Collection Station on a prearranged schedule. The application need not handle the modem link as NetRoute would do that automatically.
Data Collection Stations: An 80386 PC running DOS 5.0/Windows 3.1 with Chameleon/NFS and NetRoute installed running a dial-up modem. (This modem could probably be cellular.) This PC would not require any network-aware software; it need only be configured as an FTP server. A Windows application would be required to collect data — presumably via a serial port — from purpose-built hardware and store it in a log file for transfer. These remote stations could also be managed via an SNMP application making use of Chameleon's built-in extensible SNMP agents.

Notes — Unless your line of work entails collecting weather, air pollution, tidal or other data you probably don't see to much potential in this sort of application, but note that the TCP/IP suite is allowing the use of off-the-shelf components for an extraordinary application. Only two application-specific software components must be developed; all the network

DCS = Data Collection Station

related issues are taken care of by the TCP/IP suite. This would be difficult to accomplish in most 'standard' NOS environments, particularly where remote stations are involved.

poorly written MS-DOS client applications which do not explicitly clear file and record locks. On the client side it means that, time-outs aside, applications are immune to servers rebooting during an NFS session. This particular feature of NFS has only recently become common in PC NOSs.

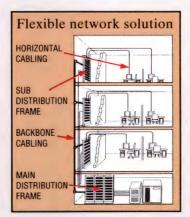On the downside, depending on the nature of client applications, PC-type NFS clients can generate significantly more network overhead than your favourite NOS. Also, NFS was not intended as a platform for database-type applications, since the environments in which it runs normally support sophisticated client-server mechanisms which are far more appropriate.

Another limit for NFS and other components of the TCP/IP suite in remote applications is the practicality of a low bandwidth connection. For example, NFS will work between two or three PCs and a remote host over a 9.6Kbps modem line just as well as it would if the same PCs were connected to an Ethernet local to the host, but it will work at a very low speed. For wide area applications, NFS will need just as much bandwidth as you favourite NOS.

Example 2: Police Information Network

Police forces in Australia have a great deal of data in a number of databases, computerised and otherwise. One of the problems which they have been trying to solve on and off for some years is making that data accessible in real time, or nearly so, to officers in the field. Another problem is that police work is expensive and budgets have always been tight, so technological brute force simply can't be paid for. Brute force in this case would be putting something like a Sun SPARCstation on the end of an ISDN Microlink in every police station in the country. Even at government prices this would cost the better part of $20,000 for the SPARCstation alone, never mind the fact that most of Australia's police stations are run by two or three officers, aren't open around the clock and are situated in country towns, most of which are served by phone lines running through non-computerised exchanges and which are prone to lightning strikes.

While personal computers and dial-up modems would lower the cost of putting a workstation into every police station, in order to make such a system worthwhile it needs to be able to handle both image and text data. The ability to handle image data is required for the transmission of pictures of suspects, missing persons, and so on. Obviously, these images should be as close to photographic quality as possible, not to mention printable.

Until recently this requirement alone has prevented any system from being cost effective. Three things have combined recently to overcome this: Microsoft has now built a multimedia capability into Windows, high speed 80486-based PCs are now relatively cheap and Intel has put its DVI technology into production. DVI provides real time hardware compression of image and stereo sound. Hardware compression and the use of high speed modems make it feasible to transfer reasonable quality images over ordinary dial-up telephone lines. And using dial-up lines lowers the chance of a live link being hit by lightning.

As you can see from the diagram below, I am depending upon Chameleon's NetRoute software to make the system viable. I am also assuming that the PC is to be left on at all times, and therefore could, with the addition of a fax modem, double as a fax machine at small stations.

The major weakness of this system (and one reason it remains theoretical) is that it would require a large amount of purpose-written software. This would be expensive to develop, however it is possible using standard tools such as C or C++ compilers and assorted SDKs which are readily available and in common use.

What can be done very easily over low bandwidth links is file transfer using either FTP (File Transfer Protocol), SFTP (Simple FTP) or TFTP (Trivial FTP). These are very robust protocols designed to cope with arbitrary bandwidth links. They are an excellent choice for use in conjunction with laptops with internal modems.

Low bandwidth links are also perfectly adequate for Telnet (terminal emulation) sessions, electronic mail transfer using SMTP (Simple Mail Transfer Protocol), POP2 (Post Office Protocol version 2), POP3, etc. and client-server applications using Berkeley 4.3 BSD sockets or the WinSock API. This means that the sort of applications required by my examples are practical to implement using off-the-shelf development tools, the catch being that if you have a heterogeneous client base you will have to develop all your client applications for each type of client. In most cases this is not economical. What *is* practical is the use of Telnet to provide 'terminal' access.

Telnet is typically implemented as a basic set of emulations with some form of entry point for third party emulation packages. These entry points are typically a DOS int

Overview of Police Information Network

Headquarters

ISDN voice & data

ISDN 2B+D voice & data

To interstate, international or other departments

Area headquarters

Major stations

Area headquarters

Major stations

Dial-up links

Small stations

Small stations

Notes:
Station PCs would be configured as follows:
80486DX 50 or DX2 66-based PC
8 to 12 mbytes RAM
Intel Action Media II board with Capture Module
DOS 5.0 and Windows 3.1
NetManage Chameleon/NFS
High Speed Modem for Data
Postscript Printer
Application software and disk as required (see Note 2)

1. While I have described only single PCs at each police station, LANs could be installed as per the DIL branches on page 97.

2. By using the Intel card for video capture intermediate storage of a captured image to disk or memory is not required, and this minimises disk and memory usage. Disk space required is therefore a function of the amount of data required by each station. I'd suggest that this would be kept to a minimum.

PC/TCP Plus

Vendor: . . . . ftp Software
Distributor: i.t. ConnXions (02) 415 0550

System Requirements:
Workstations — DOS 3.x or later, 256KB RAM available, hard disk recommended
*Network*s — Ethernet (DIX or IEEE), Token Ring or Bus, X.25, StarLAN and SLIP. SLIP is supported via PC COM: ports. Adaptors supporting NDIS, ODI, ASI or ftp's Software Packet Driver Specification.
Description & Capabilities:
Provides clients for: NFS, TFTP, RCP, TELNET (VT100, VT220, IBM 3270), POP2, POP3, VMAIL, PCMAIL, LPR, LPQ, LPRM, BOOTP, PING. Provides clients and servers for: FTP via FTPSRV and SMTP via SMTPSRV. An SNMP agent is provided. TAR and RMT (Remote Magnetic Tape) permits direct back-up to a host. TAR can also create local archives. Base product functions concurrently with most other networks. OS/2 version is available.
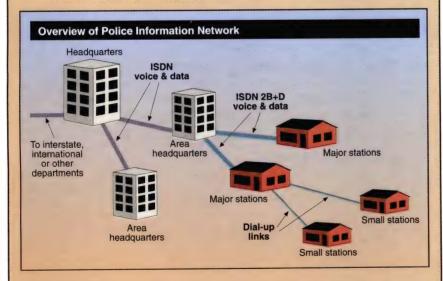**Available SDKs:**
SDK for DOS, SNMP Tools, SDK for OS/2
Limitations:
Under DOS the product is implemented as a resident TSR which loads modules of various sizes which can be memory hungry. Drives and printers must be shared from DOS prompt. Under Windows these appear as local devices.
Prices:
(Prices quoted are ex tax from distributor's price list. Prices are for single user licences. Site licences are available for some products.)
PC/TCP Plus for DOS $596
PC/TCP Plus for OS/2 . . . . . . $596
DOS SDK $800
OS/2 SDK $800
SNMP tools $480

InterCon NFS/Share
InterCon InterPrint
InterCon TCP/Connect II

Vendor: . . . . . . InterCon Systems
Distributor: . . Conexus (02) 975 2799

System Requirements:
Workstations — Most models of Macintosh with between 1 Mbyte and 4 Mbytes of RAM, depending upon combination of products used.
Networks — AppleTalk via one of the following gateways: Shiva FastPath, Cayman GaterBox, Webster MultiPort gateway, NRC MultiGate, Ethertalk via a supported adaptor.

Description & Capabilities:
NFS/Share provides file sharing as per RFC 1094 and 1057. InterPrint provides print services as per the UNIX LPR utility. TCP/Connect II provides implementations of the following RFCs:

RFC	Protocol	RFC	Protocol
791	IP	1065	SMI
826	ARP	937	POP2
768	UDP	1081	POP3
793	ICMP	821	SMTP
882/3,973	DNS	977	NNTP
950	subnets	854/5	TELNET
1055	SLIP	959	FTP
1098	SNMP	742	FINGER
1066	MIB	951	BOOTP

Protocols discussed in RFCs 856-8, 885 and 930 are also supported by Connect II.

Prices:
(Prices quoted are ex tax from distributor's price list. Prices are for single user licences. Site licences are available for some products.)
InterCon NFS/Share $445
InterCon InterPrint $293
InterCon TCP/Connect II $445

14(H) handle, BAPI for example, or a Windows API. Most Telnet implementations will provide at least VT100 and 'glass teletype' emulations. The test of a good Telnet implementation (or emulation package for that matter) is the way in which it handles host-initiated emulation changes. For example, it is quite common for a user of a VT220 terminal to log on to a host and have an application switch the VT220 into VT100 or even VT52 emulation. All too many terminal emulation packages force the user to manually switch emulations in this situation. Another couple of revealing tests are the package's handling of keyboard mapping and in particular function keys.

To use any link, low bandwidth or otherwise, you need something to drive a modem, in other words a router (sometimes referred to as a gateway in TCP/IP parlance). TCP/IP can be transmitted over a bridge but to do so would mean either transmitting a large amount of broadcast traffic — to be avoided on a low bandwidth link — or buying a separate unit into which a filter can be programmed to eliminate anything but non-broadcast IP packets. Such a device will cost several thousand dollars and would be difficult to justify for a small branch office. Many routers are simply software packages

which run on multi-homed hosts, that is, a machine which is physically connected to more than one network.

NetManage's NetRoute, which is included in the Chameleon/NFS package, is just such a software router. Specifically, it is a static IP router which is capable of routing between Ethernet, Token Ring, FDDI and serial lines. Serial lines are supported via SLIP (Serial Line Internet Protocol). It has a number of potential uses, some of which are shown on page 98. As NetRoute is a static router, its routes are set manually from a Windows application interface. They do not change dynamically in response to altered network link states, etc. For a low cost, low bandwidth router intended to run as a background process on a Windows workstation this is perfectly reasonable.

As far as network servers, or hosts, are concerned you may well find that using the TCP/IP suite as a standard NOS provides you with a far greater range of options than the 'standard' NOS you are probably running now. For example any Unix box from SCO, Sun, Digital, HP, etc. through to most supercomputers supports Sockets, Telnet, NFS and SMTP or POP. Many non-Unix systems such as Digital's OpenVMS provide some TCP/IP suite protocol implementations. Most of them also support some form of SNMP (Simple Network Management Protocol) console and the TCP/IP suites from NetManage, ftp and InterCon provide an SNMP agent. This makes central monitoring of a network system down to the workstation level practical and some degree of workstation control a possibility. The latter will require the use of development kits and probably Microsoft's Windows SDK (Software Development Kit). Unfortunately TCP/IP suites for desktop machines are considerably more expensive than the client software found in most NOSs.

In summary, the TCP/IP suite in general and the implementations discussed here provide far more flexibility and reliability than most of the market leading NOSs when unusual or costly configurations are required. In dollar terms they are far more expensive then any of the NOSs you are probably using now. They also require far more careful set-up. TCP/IP suites are not yet 'plug and play' commodity items. Users will find them much more useable than, say NetWare pre-3.X or LAN Manager pre-2.X, but you will have to understand IP addressing. You will also find life much easier if you have a broad understanding of IP routing (in fact these packages would be excellent teaching tools for these skills). If you don't understand these things you will probably have to spend some time being walked through the manuals by vendor support staff, but you will get things working.

In most cases I suspect you will find TCP/IP suites a valuable addition to your existing network, rather than a replacement

Chameleon/NFS

Vendor: . . . . NetManage
Distributor: i.t. ConnXions (02) 415 0550

System Requirements:
Workstations — 80386/486 Enhanced Mode, DOS 5.0 or later, Windows 3.1
Networks — Ethernet, Token Ring, FDDI and SLIP. SLIP is supported via PC COM: ports. Other networks listed via any adaptor with an NDIS driver.

Description & Capabilities:
Chameleon/NFS is 100% DLL-based. 6KB is permanently resident. Provides full TCP/IP stack. Provides both client and server implementations of: NFS (network drives and printing), FTP, TFTP, SMTP/Mail, POP2, Ping and Bind. A basic DNS is also provided. Provides Client-only implantations of: Telnet (VT100, VT220), TN3270. Provides an extensible Simple Network Management Protocol agent. Provides applications to customise set-up and view workstation statistics. With the addition of IPX/Link provides concurrent operation with NetWare. Base product functions concurrently with most other networks.

APIs Provided and Available:
Berkeley 4.3 BSD Sockets API; Windows Sockets API (WinSock); FTP DLL for file transfer; SMTP DLL for mail; SNMP agent API; RPC-DLL (Runtime DLL for Sun RPC/XDR. Separate product).

Available SDKs:
NEWT SDK — Provides all but RPC libraries; RPC SDK — Provides libraries for RPC-DLL.

Limitations:
Since the product is DLL-based, DOS sessions under Windows cannot use network drives.

Prices:
(Prices quoted are ex tax from distributor's price list. Prices are for single user licences. Site licences are available for some products.)
Chameleon/NFS $826
Documentation for above: $47
IPX/Link $215
RPC-DLL $171
Documentation for above: $47
NEWT SDK $899
Documentation for above: $47
RPC SDK $629
Documentation for above: $47

for it. As networks grow the market for these products will also grow, their price will fall, and manufacturers will simplify things like set-up procedures while adding more features. In the future they may provide a certain amount of competition for many mainstream NOSs, but only time will tell. Who knows, maybe someone in this clever country might provide a national TCP/IP internetwork with an Internet gateway which provides dial-up or leased line access and which is open to all. There might even be some money in it for a telecommunications provider, or some good publicity for a newly elected government — (hint, hint).

Graeme Le Roux is a Director of Moresdawn Pty Ltd (Bundanoon, NSW) and specialise in local area network consulting services.

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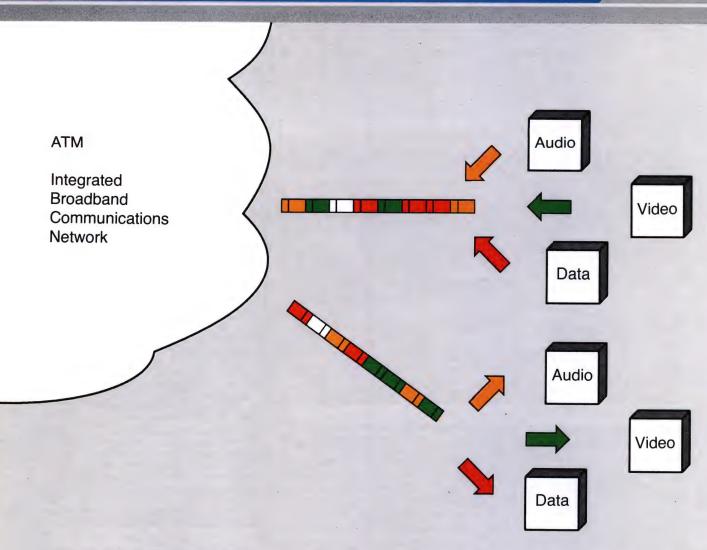
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Token Ring Management Around Beaconing Stations

Product:	Token Ring Smartlink
Vendor:	MM Data Networks 423 Pennant Hills Rd Pennant Hills NSW 2120 Tel: (02) 980 6922 Fax: (02) 980 6795
Price:	Price on application
Features:	In-band management during beaconing and management of third-party hubs and MAUs

Token Ring LANs are an all-or-nothing proposition. Either they operate quickly and reliably, or — if just one attached station malfunctions — they don't work at all. Beaconing, the signal that indicates trouble on the ring and halts it from operating, is also bad news for network management systems, since it cuts off communications just when the network manager most needs to be in control.

Fibermux says it's developed a fail-safe way to keep managing Token Ring LANs when beaconing occurs. The vendor is now shipping the Token Ring Smartlink, a management module for its Crossbow smart hub. By using two controllers, Smartlink maintains contact with all stations attached to the hub, regardless of the ring status.

Smartlink can also manage third-party hubs and MAUs (multiple access units) attached to a Crossbow hub. Smartlink can gather performance statistics and diagnostic information from these third-party devices, which may not contain their own management agents.

By maintaining contact with all attached stations, Smartlink allows network managers to track the Crossbow hub's automatic process for restarting failed Token Rings. If the automatic process fails, as occasionally happens, net managers simply remove the beaconing station from the Crossbow hub and restart the ring. Automatic restart can be hindered when adaptor cards try to restart themselves, or when users try to reboot their failing stations.

During normal hub operation, the Token Ring Smartlink module also links Crossbow hubs with simple network management protocol (SNMP) network management stations. Smartlink also uses integral software agents that collect information about the hub and pass it along to network management stations such as Fibermux's Lightwatch. The Token Ring Smartlink also can link Crossbow hubs to IBM's NetView and LAN Network Manager systems.

The new Token Ring Smartlink is Fibermux's first product to manage multiple Token Ring segments. A Smartlink-equipped hub can accommodate up to 14 local area network segments, or up to 140 users. (The 14-slot Crossbow also can handle up to four Ethernet segments in one hub, along with 10 Token Ring segments).

In-Band Management

Fibermux says Smartlink is the first product to perform in-band management, or direct connection with stations on the ring once a station has failed. Most other vendors' hubs provide out-of-band management, which uses alternate circuits between the hub and management station when a Token Ring is beaconing. Vendors whose hubs perform out-of-band management include Cabletron Systems, IBM, Optical Data Systems and SynOptics Communications.

Out-of-band management can only link hubs to management stations; it does not link individual stations on a disabled Token Ring to the management system, allowing the network manager to take control of the beaconing station by turning it on or off. Fibermux says the new Token Ring Smartlink does allow net managers to take direct control by disconnecting beaconing stations from the Crossbow hub.
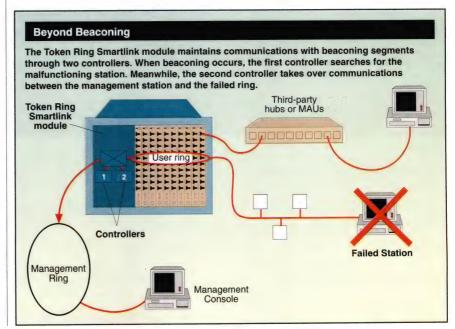
The Smartlink module uses two controllers to provide its management features (see figure). Each controller includes a Texas Instruments TMS380 Token Ring chip set, Fastmac driver firmware from Madge Networks, and SNMP agent software created by Fibermux. The Fastmac firmware links the hub to other vendors' net management systems.

During normal hub operation, one of the controllers handles the flow of network management information from hub to management station. When a network station begins beaconing, the first controller activates a search for the station which is malfunctioning. At the same time, Smartlink's second controller takes over the communications between the management station and the failed ring.

The Token Ring Smartlink maintains contact with individual stations through an internal management bus. Unlike net management modules from other vendors, this bus is connected with the agent that is activated between hub and management station during beaconing failures.

Fibermux is also set to introduce Lightwatch/Open, an application that will allow Crossbow hubs equipped with the Token Ring Smartlink or Ethernet Smartlink modules to be managed by Hewlett-Packard's Openview Network Node manager system. **Mary Jander**

Beyond Beaconing

The Token Ring Smartlink module maintains communications with beaconing segments through two controllers. When beaconing occurs, the first controller searches for the malfunctioning station. Meanwhile, the second controller takes over communications between the management station and the failed ring.

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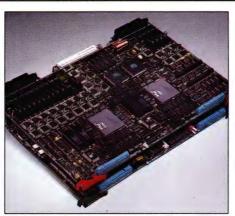**Advanced ISDN**
Terminal Adaptors
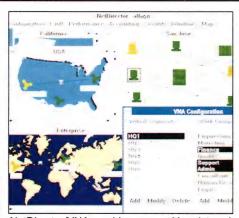
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NetDirector/VNA provides users with point-and-click control over VNA workgroups

The DragonSwitch uses four Intel 960 RISC processors to deliver dedicated 10Mbps bandwidth

U-B Unveils Virtual Network Architecture, ATM Plans

Virtual reality may still be largely on the drawing board but virtual networking is here already following the release of Ungermann-Bass' new Virtual Network Architecture (VNA).

Fundamentally a software-based architecture, Ungermann-Bass' VNA allows users to associate ports with each other to create workgroups without reconfiguring LAN wiring or purchasing new hubs. According to U-B, it will enable users to create a near unlimited number of virtual workgroup segments within an existing hub.

Key to the new architecture is two building blocks: The virtual segment and the virtual workgroup. In normal parlance, a network segment is a subdivision of a LAN that can be considered self-contained. The same definition applies with VNA's virtual segment concept, except that the ports no longer need to be physically contiguous or share the same cable. Virtual segments can be kept isolated and secure and — in VNA's first release — capable of supporting 32 virtual workgroups.

A VNA virtual workgroup can contain an unlimited number of VNA ports within a single module, within a hub or even across and between hubs. Ports can even be in different workgroups providing each group is in the same virtual segment.

Company officials say that VNA learns the source MAC address, Access/One slot and port number when an end station transmits a packet. Communication between known end stations in the same workgroup is switched between VNA ports and not transmitted to other ports, even ports in the same workgroup. To traverse the Access/One's 300Mbps PlusBus backplane, a special packet format containing destination slot, port and VNA configuration is used.

The first hardware product implementing VNA is U-B's new DragonSwitch for Ethernet, a switching module for U-B's Access/One hub that can provide dedicated 10Mbps bandwidth to the desktop or a workgroup segment. Each DragonSwitch can support up to 16 10Base-T ports and an Access/One hub can accept up to

five of the modules for a maximum of 80 ports, or 40 simultaneous conversations. Each DragonSwitch port provides a dedicated 10Mbps connection to individual workstations, servers or hubs, although U-B officials say the optimal configuration is no more than 24 end station MAC addresses on each port.

A two-board module, the DragonSwitch uses four Intel 960 RISC processors and U-B's customised ASIC technology. One board contains the 16 ports and handles traffic filtering to ensure that only traffic destined for a port actually traverses that port; the second board handles access to the Access/One's PlusBus. The product supports SNMP and can be managed by an SNMP manager. It also supports the Trivial File Transfer Protocol (TFTP) and BootP for standard configuration download from any SNMP network manager, U-B officials say. It also marks a transitional step from traditional shared media LANs to asynchronous transfer mode (ATM) technology, they claim.

To manage VNA networks, U-B has released NetDirector/VNA, a new application for the company's NetDirector network management system. NetDirector/VNA provides point-and-click control over the creation and management of up to 65,000 virtual work groups or network segments independent of the underlying physical topology. Shifting a user from one workgroup to another is as simple as clicking on a user's icon and moving it to the new workgroup, U-B officials claim.

VNA, which is now the umbrella architecture encompassing all future Ungermann-bass products, will be implemented in three phases. Phase One is the rollout of DragonSwitch for Ethernet; Phase Two (by the end of this year) will extend VNA to the wide area through virtual workgroup support across bridges and routers; and Phase Three (early 1994) will extend VNA to what U-B calls the total area ATM networking environment. U-B is promising to deliver ATM switching with VNA support across the LAN and WAN starting early next year.

Ungermann-Bass (03) 696 2006

Retix Synchronises E-Mail Directories

OSI specialist Retix has released a new software product family designed to provide enterprise-wide interoperability between heterogeneous electronic mail systems.

Dubbed the OPENMessaging Solution, Retix's new product line has four components:

■ The OPENServer 400 family of X.400-based messaging servers that link different e-mail systems to each other and to public mail networks that support X.400;

■ The OPENServer DXS (Directory Exchange Server) which, in conjunction with new Directory Exchange-enabled gateways synchronises heterogeneous e-mail directories;

■ A new range of OPENServer Gateways to X.400 which map proprietary e-mail system formats into the standard X.400 format; and

■ OPENServer Remote Manager, a network configuration and management facility that provides a schematic view of an OPENServer network.

Directory Exchange (DX) is Retix's solution to the problem companies face in trying to integrate the directories associated with their existing proprietary e-mail systems. At configurable time intervals, each system sends copies of any directory changes to a central server via an agent that converts the entries, which are sent as X.400 messages, into X.500 format. The central server then distributes updates to all connected directories, once again as X.400 messages, and agents convert the new entries into the appropriate format.

By using the DX approach, OPENServer DXS provides directory synchronisation within a heterogeneous environment by providing a central repository for all user network address information. The product maintains a database comprised of all the user information from each network mail system and propagates that information to participating mail systems via DX-enabled gateways.

The new family of OPENServer Gateways to X.400 con-

Olicom's CAU can support 80 Token Ring lobes

World's fastest? An EISA 16/4 Server Adaptor

Olicom Claims World's Fastest Performance

Olicom, the Danish company which claims to be the world's second largest supplier of Token Ring products after IBM, recently released several new products — including two for which it is claiming world-beating performance.

Heading the list is the new EISA 16/4 Server Adaptor which company officials claim has a throughput at frame sizes less than 256 bytes or more than twice that of competing products. This world's fastest performance claim stems from the new adaptor's design, which is based around running in DMA burst mode using 32-bit data transfer and 512KB of on-board memory. Burst mode operation also means that up to eight adaptors can be installed in one PC. Fully IBM compatible, the new EISA 16/4 Server Adaptor also features on-board UTP and STP support and can run at both 4Mbps and 16Mbps.

Also claimed to have world-leading performance, Olicom's new Wire Speed Local Bridge 16/4 can forward over 27,000 28-byte frames per second. A source-routing two-port bridge that supports UTP and STP wiring, the device has a 2 x 16 character display for diagnosis. It fully supports IBM Network Manager/NetView as well as SNMP, for which it supports MIB II, Bridge MIB and Olicom's private MIB.

The bridge also supports a variety of filter programs which can be managed remotely via the SNMP Monitor or from Olicom's Bridge Manager. Company officials claim these filters can be changed dynamically, without restarting the bridges. Bridge Manager also allows network managers to distribute software updates simply and easily over the network, they say.

Also released, Olicom's new UTP Multistation Access Unit (MAU) can connect up to eight Token Ring devices over unshielded twisted pair wiring. Rack-mountable, the MAU features an internal power supply and LED indicators for each lobe.

Rounding out the product announcements is Olicom's new Controlled Access Unit (CAU) intelligent hub for Token Ring networks which is able to connect up to 80 Token Ring network lobes via up to four Lobe Access Modules (LAMs). LAMs are provided in shielded and unshielded twisted pair wiring versions and can operate without the external filters.

In addition to supporting SNMP, the CAU can improve network availability by automatically recovering from most network failures, officials claim. As well as providing for the bypass of faulty components and wiring, this fault tolerance also extends to a serial port to provide network managers with an out-of-band management capability.

Force Technology (02) 971 1000

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or third party Netware Loadable Modules, Solve:LAN manages the user access, the server's internal environment, inter-LAN and LAN-mainframe communications. It also monitors disk usage and errors down to the directory and file level.

System prerequisites include NetWare v3.11 with either NetWare for SAA v1.2 or the Netware Management Agent for NetView v1.2.
Software Developments (02) 975 4777

Link Tester

Silver Networks Australia recently announced a link tester for testing the configuration and pin-outs of unshielded twisted pair modular cable assemblies.

The pocket-sized Modular Cable Link Tester checks the function of RJ11, RJ12, RJ45 and DEC modular cables, and can also determine the pin-out configuration.

Supplied with an internal replaceable 9V battery, the Link Tester is priced at $120.
Silver Networks Australia (02) 906 6555

Apple Router

A new family of internetworking router software products from Apple Computer provides wide area networking connectivity through the implementation of a new technology called the AppleTalk Update-based Routing Protocol (AURP).

AURP has been designed to boost AppleTalk use on WANs, allowing users to interconnect local and remote Macintosh and PC workgroups. It can allow

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vert proprietary e-mail systems (such as WordPerfect Mail, Microsoft Mail, cc:Mail and others) into X.400 format for routing across the network by OPENServer 400. They include DX agents to exchange information with OPENServer DXS and other features to minimise management tasks. These features include AliasMapper, which provides alias mapping for automatic alias and originator/recipient name generation; and Auto-Registry, for the automatic registration of foreign, incoming and outgoing X.400 names into the alias database.

OPENServer Remote Manager uses a Windows-based interface to allow users to obtain OPENServer status and pinpoint problems. It enables all OPENServer messaging servers to be configured from a single map, company officials say.
Retix (03) 629 2595

Net/Master-NetWare Integration

Software Developments has released Solve:LAN for NetWare, a new software package which allows its Net/Master product to monitor and manage Novell NetWare LANs.

According to company officials, the new product provides access to Novell's NetWare for SAA Netware-to-IBM host communications platform and helps data centres centralise the management of large remote Novell, Microsoft, and IBM LANs.

Using Solve:LAN for NetWare, operators at a Net/Master console can monitor LAN events and alerts and enter NetWare administration and control commands. Along with managing the LAN media and networking protocols and NetWare

Link Tester can test the pin-outs of UTP cabling assemblies

AppleTalk networks to be 'tunnelled' through dial-up connections via standard modems, or through non-AppleTalk network systems such as X.25 and TCP/IP, OSI and DECnet.

According to Apple, the new protocol significantly reduces network traffic and provides enhanced local area networking support, routing data between LocalTalk, Token Ring, Ethernet and other network types.

The Internet Router family includes a base connectivity kit and two extension kits for moving AppleTalk data across non-AppleTalk networks. The Basic Connectivity Package provides the core router software and technology including a dial-up extension for connecting remote workgroups together over standard telephone lines as well as network management support through SNMP.

The two extension packages, called the AppleTalk/IP Wide Area Extension and the AppleTalk/X.25 Wide Area Extension, provide wide area AppleTalk routing over TCP/IP and X.25 networks respectively.

The new Internet Router family will replace the current AppleTalk Internet Router 2.0, and is now a completely re-designed product with many additional capabilities. New features include network number remapping, which allows users to connect independently administered networks without concern for network numbering conflicts; security options to protect networks from unauthorised use; and built-in data compression for increased throughput.
Apple (02) 452 8000
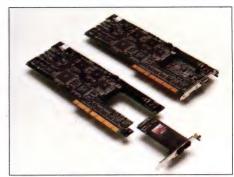
Twinax Active Star

Recently released in Australia by Dataplex was the new Adacom AS-2299 Twinaxial Active Star which is said to extend the host-device distance over unshielded twisted pair Type 3 cable. According to company officials, the new product also allows the connection of twinaxial devices in a star configuration, and enables each device to operate as if it is the only one attached to the host.

The AS-2299 uses inexpensive Type 3 UTP cable for at-

New 3Com terminal servers support 48 ports

FDDILink adaptors are priced from $2,500

3Com Unveils Terminal Servers, FDDI Adaptor Pricing

3Com Corporation has unveiled a new family of multiprotocol terminal servers conforming to the OSI implementation of the IS VTP (Virtual Terminal Protocol) standard. The US networking specialist has also released pricing details for its FDDILink range of FDDI network adaptors.

The new CS/3000 (diskless) and CS/3100 (with internal floppy disk drive) terminal servers are priced from $245 per port and are suited to network users who require high port density, according to company officials. The products offer up to 48 RS-232 or RS-423 ports plus 1 par- allel printer port in a 9.6cm high chassis.

Able to provide concurrent access to multiple hosts running different protocols, the devices can support up to eight simultaneous sessions per port using TCP/IP, LAT, OSI and TN3270. They also provide support for the Serial Line Interface Protocol (SLIP) and can be configured with a range of transceiver modules

for thin coax, unshielded twisted pair and fibre media, or an AUI module requiring an external transceiver.

Company officials said that software for the new products is to be sold under a new pricing scheme called ProtocolPack. Priced at $1,450, ProtocolPack software is available in two versions, both of which include software for TCP, TN3270 and OSI plus RBCS boot-image software and CS/3100 boot software. One version also includes DEC LAT software.

Available now in shielded twisted pair and fibre versions with an unshielded twisted pair version to be released soon, 3Com's new FDDILink family of 32-bit EISA adaptors are priced up to 50% below comparable products, according to 3Com officials. The FDDILink-STP adaptor is priced at $2,500 and the FDDILink-F model is priced at $3,695.
3Com Corporation (02) 959 3020

tachment without signal degradation, and provides a choice of twinax or fibre optic cable as host attachment options. It also boasts maximum AS/400, S/3X distances of 900 metres with UTP, 1.5km with twinax and 3km with fibre optic cable.

Fully transparent to the system data stream, the device is fully fault tolerant and can detect and isolate streaming devices or shorted cables without disrupting other devices.
Dataplex (03) 210 3333

LAN Facsimiles

PCWare Australia has released Trio DataFax, a new Windows-based software product which allows incoming faxes to be converted to editable text on a LAN.

Trio Datafax runs on any PC network and is able to send faxes in five different ways — as a printer in any Windows applica-

tions that can print; using the Captive button which can enable the sending of messages without starting an application; using Drag & Drop to send ASCII, PCX, TIFF, Meta and Fax files; by implementing the fax function directly from an application using standard DDE support; and using Cut and Send to fax any part of the screen.

The network version of Data-Fax registers all users in the sys-

tem via the LAN and then routes faxes to users via a fax log. The product provides full support for pictures, grey scales and fonts, and includes a coversheet editor with full desktop features including drawing tools and also a tool box function which copies incoming faxes to a clipboard.

Users also have the option to schedule incoming faxes to new locations, and there is an anti-junk mail function which allows

The Adacom AS-2299 extends host-device distances

LANDesk is a Windows-based application

StorageExpress features dual tape drives

Intel Bolsters Network Management, Backup Offerings

Intel has continued its move into networking with the release of three new products designed to enhance network management and improve network backup.

Heading the list is the company's new LAN-Desk Manager, a set of software tools which simplify the management of networked desktop systems and related services on Novell NetWare 3.1X LANs. The Windows-based package lets the network operator remotely view, diagnose and troubleshoot a multiple workstations or file servers, ask for system information and make changes to the system quickly and easily, company officials claim.

Priced at $1,799, LANDesk Manager provides a single point of control for an array of local network management tools, including core desktop and LAN monitoring software. These tools include: Desktop Access, to centrally manage LAN resources; Traffic Monitor, which displays a real-time summary of LAN packet level traffic; Application Monitor, which monitors network applications; Inventory Manager, which collects network hardware and software configuration data; Virus Scan, for virus detection and removal; and Remote Access, which can establish async communications links.

Also designed to improve network management, two new members of Intel's EtherExpress LAN Adaptor family offer flash memory support to help network managers configure and manage networked systems in one step. Priced at $360, the new EtherExpress FlashC adaptor be managed remotely using Intel FlashWorks utilities, including FlashStart, which automatically installs the adaptor on the network and downloads driver and configuration files onto the PC hard disk. Priced at $345, the EtherExpress 16C adaptor can accept a flash memory upgrade. Both products are 8/16-bit ISA cards supporting thin, thick and 10Base-T Ethernet cabling and able to incorporate 256KB of flash memory.

Rounding out the announcements is the Intel StorageExpress system, which company officials say is an integrated solution for centrally managed, unattended backup of file servers and workstations on Novell NetWare networks. The system includes an intelligent control unit preconfigured with Novell's NetWare Runtime, a peripheral unit that supports two 8mm magnetic tape drives and a Windows 3.1-based application that enables point and click customising of backup and restore functions.

Priced from $16,975, the product has been developed in conjunction with backup software specialist Cheyenne Software.
Intel (02) 975 3300

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unwanted numbers to be rejected. All incoming faxes are stored in the DataFax phone book, and the product's Smart Dialling feature automatically adjusts to the phone system in different countries, so international numbers need not be altered when travelling across state and international borders — the user just needs to identify the fax destina-

tion. The DataFax dialling directory can be exported to external files, while external databases can be imported into the DataFax dial directory via a template.

Datafax also features automatic control of fax traffic and provides a detailed overview of inbound, outbound, transmitted and erroneous logs which are all dynamically updated.
PCWare (02) 252 3546

Token Ring Extenders

RAD Data Communications has extended its Token Ring Elementary Bridge family with the

RAD's TRE-8 can support up to 80 remote workstations

addition of the new TRE-1 and TRE-8 16Mbps Token Ring Extenders, and the RR-TRE module for the RADring Modular Hub.

Connecting up to 80 remote workstations to a 4 or 16Mbps Token Ring LAN, the TRE extenders operate like self-learning MAC level remote bridge, with filtering and forwarding to ensure that only packets addressed to a location are transmitted. It operates at rates of up to 512Kbps, and includes serial link start-up and recovery.

The RR-TRE is a module version of the TRE for insertion in the RADring modular hub. According to company officials,

up to 10 RR-TRE modules can be inserted into a RADring hub, which is able to connect up to 80 workstations on 4 or 16Mbps Token Ring over UTP, STP, fibre optic or coaxial cable.
Dataplex (03) 210 3333

PPP Routing

LAN^{2}LAN routers and remote PC nodes from Newport Systems Solutions now support PPP, a de facto standard describing a method of interconnecting routers using point-to-point links.

PPP allows for the simultaneous transmission of multiple protocols like IPX, and AppleTalk across a single serial link, with no speed limitations, and allows communication between 'incompatible' routers that support the protocol. NSS's LAN^{2}LAN/Mega, LAN^{2}LAN/MPR and LAN^{2}PC/Mega can now communicate with other vendors' routers that support PPP.

LAN^{2}LAN/MPR can send IPX and IP data via PPP to any other router supporting PPP, to another LAN^{2}LAN/MPR, or to a PPP-compliant bridging router. It can also send MAC-layer bridge data. Both the LAN^2-LAN/Mega and LAN^{2}PC/Mega can send IPX, IP and Appletalk data via PPP to any router supporting PPP.

NSS officials say remote site users of the LAN^{2}LAN PPP products could achieve significant cost savings because they no longer need to purchase the same proprietary routers used at the head office. The LAN^{2}LAN/Mega router with two WAN ports is priced at $4,280, while the LAN^{2}PC/Mega remote node is priced at $2,033, and the LAN^{2}LAN/MPR router with two WAN ports costs $4,280.
LAN Systems (02) 901 3655

Lannet Management

Toren Computer Communications has announced the Australian release of two new Lannet products: BrxMultiMan, a software product integrating Lannet's MultiMan SNMP management platform with a bi-directional IBM NetView communications gateway; and Lannet's Smart Hub, a network manage-

ment implementation for Hewlett-Packard's Open View v3.1 Network Node manager.

Jointly developed by Brixton Systems and Lannet Data Communications, the new BrxMulti-Man software module can transfer alarms captured by Lannet's MultiMan software to the IBM NetView central management facility for logging and analysis, and can also receive commands from a NetView host.

BrxMultiMan uses the functionality of Brixton's BrxPU2.1 SNA Server to connect to IBM's SNA networks. The software facilitates co-management between IBM and Lannet network management tools — allowing IBM network operators to monitor via NetView LANs managed by Lannet's MultiMan SN-MP network manager, company officials said.

Lannet's new Smart Hub network management graphics implementation for OpenView is fully SNMP compatible and also fully manageable by Lannet's MultiMan network manager, or Multi-Man/OV, a graphical user interface for Hewlett-Packard's Open View 3.1.

Within the OpenView platform, Lannet's MIB will be accessed through Hewlett-Packard's MIB Walker utility, and Traps issued by the Hubs will be directed to OpenView for display and status updates to the network map.
Toren (03) 242 5050

Terminal Servers

Recently released onto the Australian market by Elmeasco is a range of terminal servers which company officials claim provide high performance I/O expansion capabilities via the SCSI port of Unix-based workstations.

Developed by Central Data Corporation, the new line comprises several models, ranging from a two serial and one parallel port version to a workgroup version that allows as many as 392 serial and 49 parallel ports from a single SCSI slot.

Central Data's terminal servers support up to 392 serial ports

The new terminal servers are interoperable with the leading Unix workstation product families including Hewlett-Packard Apollo 9000 Series 300, 400 and 700 systems; Sun Sparcstations; DECstations; IBM's RISC System/6000; SGI's IRIS workstations; NeXT workstations, and 386/486 PCs running Microport SVR4, SCO Unix 3.2.4, or Sun's Solaris 2.0.
**Elmeasco Instruments
(02) 736 2888**

Ethernet NICs

Artisoft Australia has debuted the first of its products to incorporate the ALICE (Artisoft's LAN Interface Chip for Ethernet) controller, an Ethernet integrated circuit, which ensures that the adaptors are ready for use as soon as they are plugged into the network.
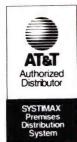
The LANtastic NodeRunner 2000 Series adaptors are 16-bit

RND's LTE can connect Ethernets over a fibre backbone

Ethernet adaptors supplied with 32K onboard buffer RAM and autosense between 8- and 16-bit PC expansion slots.

The ALICE controller is the only integrated circuit to support both ISA and MicroChannel bus architectures, and, at less than one square inch, the controller is small enough to be incorporated into PC motherboards, eliminating the need for network adaptors, say company officials.

The controller is compatible with Artisoft's AE-2 Ethernet design, along with Novell's NE 1000, NE2000 and NE/2 adaptors. The LANtastic NodeRunner 2000/C model has a BNC connection on thin coax cable. The 2000T model has an RJ-45 connection for UTP cable and can be connected internally to an Artisoft Peer Hub 10BaseT concentrator. The 2000/A model has AUI, BNC and RJ-45 connections for use with thick coax and UTP cabling and can be connected to a Peer Hub 10Base-T concentrator. The 2000M/TC model is a MicroChannel adaptor with BNC and RJ-45 connec-tions for use with coax and UTP cabling schemes.

Also available is the LANtastic NodeRunner Starter Kit which consists of two adaptors, the LANtastic Network Operating System for up to 300 users, cabling and documentation. **Artisoft (02) 880 2688**

Translation Bridge

RAD Network Devices has released a new translation bridge which boasts user definable protocol translation filters, along with built-in multiprotocol conversion tables and tools for customisable data translation.

According to company officials, the Local Token Ring-to-Ethernet (LTE) bridge can be used in a pure local environment for connecting dissimilar departmental LANs to a backbone, or in an enterprise-wide application with remote bridges and routers.

Enabling interconnection between Ethernet IEEE 802.3 and Token Ring IEEE 802.5, the device's Ethernet interface supports 10Base-5 or 10Base-T and the Token Ring interface supports UTP or STP cabling environments.
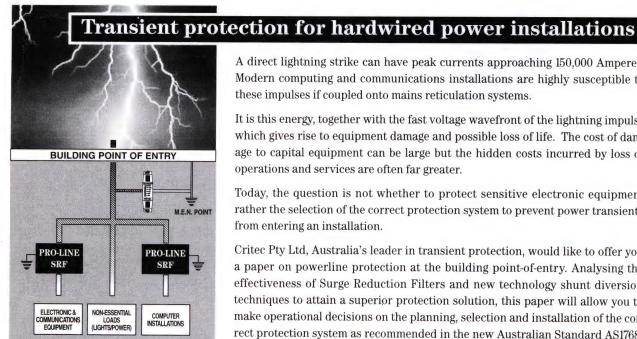
In addition, an optical fibre interface in the unit allows the router to support single mode or multimode fibre.

Both the IEEE 802.1D Spanning Tree Algorithm and SRT Source Route Transparent standards are supported, as are the emerging IEEE 802.1H standard for converting, translating and tunnelling protocols including TCP/IP, IPX/SPX, NetBIOS, and AppleTalk II. **Toren (03) 242 5050**

Bridge Upgrades

Olicom has boosted its PC-based Token Ring bridge range by adding SNMP and OS/2.2.0 support, and new features including dynamic filter management and monitoring of WAN utilisation and compression ratios.

Along with support for MIB II, Bridge MIB and Olicom's private MIB, the products now support a dual network management strategy and continue to support IBM's LAN Network Manager/NetView.

The bridges offer four filter programs — MAC filter, NetBIOS filter (including the NetBIOS broadcast filter), Protocol filter and Security filter — all of which are managed remotely from the bridge manager or a SNMP monitor, and are able to be changed dynamically.

A new Remote Bridge feature facilitates monitoring of the WAN link utilisation and compression ratio. This data can then be loaded into a spreadsheet, and graphs can be generated.
Force Technology
(02) 971 1000

BERT Test Set

The new version of Tektronix's CSA 907 Bit Error Rate Test Set is able to drive and receive posi-tive ECL signals, a feature company officials say is critical in testing FDDI compliance. The device also includes a new burst mode which allows simulation of burst patterns for testing systems that use non-continuous signals.

The 700Mbps bit error rate test set comprises two units — the CSA 907A Tx Pattern Generator and the CSA 907A Rx Error Detector.

Company officials claim that with the inclusion of Frame-Writer, a menu-driven, personal computer-compatible software product, the new test set allows the creation and editing of high speed FDDI and SDH/Sonet patterns on an external computer which can be downloaded to the CSA 907A.

Also boasting 128K of extended memory, the CSA 907 allows FrameWriter to send contiguous frames for network element evaluations or insert intentional byte errors in the frame overhead.
Tektronix (02) 888 7066

Management Software

Transview, a full suite of network, systems and application management products from Siemens Nixdorf is now available in Australia.

Supporting SNMP, DAME, DSM, ASDIS and GKMS applications, Transview is designed to interconnect and operate disparate computer systems running different operating systems.

Company officials claim the system can manage various net-work devices in terms of configuration, fault diagnosis, performance, security, accounting and remote operating.

Transview SNMP provides an operator interface based on X Windows that provides the management and agent function for various systems and devices.

Transview-DAME is an administration management system which allows uniform, integrated management in centralised and decentralised forms.

Utilising a toolkit approach, the product provides for proj-

The CSA 907 test set can drive and receive positive ECL signals

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Hayes' Optima 2400 is priced at $609

ect-specific adaptations and expansions, and supports the management of fault, performance and security areas. Also enabling hierarchical network structure, the product offers management from a central location.

The DSM and ASDIS product families enable the automated distribution of software within hierarchical and centrally controlled computer networks. They also allow central planning and administration of the software configuration, supply of defined software to connected systems, and the central control of distribution and installation, Siemens Nixdorf officials say.

The GKMS application has a graphical user interface for the central planning documentation and installation of computer and network configurations.
Siemens Nixdorf
(02) 439 5477

V.42 Modem

The just released Hayes Smartmodem Optima 2400 is now available in Australia. It has V.42 error-control as well as V.42*bis* data compression for throughput up to 9600bps.

Along with support for V.22 and V.22*bis*, it supports Hayes' Autosync Smartmodem feature enabling it to communicate both asynchronously or synchronously without an SDLC card.

Priced at $609, the unit is supplied with Smartcom EZ software. The menu-driven software offers phone book entry capacity to store frequently called numbers, along with keyboard macros and Autotype — which officials claim enables effortless transmission of files. It carries a two year limited performance warranty.
MPA (03) 724 4444

Terminal Emulator

Megatec has released a terminal emulator which enables Windows users to run text, ReGIS and also Sixel applications from DEC VAX host computers.

The new Reflection 4 for Windows VT340 terminal emulator includes features such as colour rendition, scaling quality and speed, along with accurate VT340 emulation.

According to company officials, the product enables access to graphic data from host applications for use with Excel, Word, Lotus 1-2-3 for Windows or other Windows applications. The program also allows users to save the currently displayed graphic to a Sixel file on their local drive for later display.

Also featured is a Graphical Keyboard Remapper enabling users to point and click on a PC and VT keyboard to re-map their PC, LK250 or LK450 keys to VT keys, strings or macros.
Megatec (03) 874 3633

PC-Fujitsu Host Links

Eicon Technology's Access for Windows (3270) PC-to-mainframe software now supports Fujitsu's F6680 extended Attrib-

utes Buffer, allowing users to work with Fujitsu's extended fields, seven colours, graphics, field outlining, reverse video and blinking.

Platforms supported by Access for Windows include Eicon's SNA Gateway over X.25, SDLC or TIC connections, direct Token Ring connections, DCA/Microsoft's Communications Server 1.1, PC 3270 Emulation Program Version 3, and SNA DFT Coax.

In addition, standard features of IBM 3270 display and printer terminals are provided on the software, as are IBM 3270-PVC File Transfer, PS/CICS DISOSS File Transfer, Programmed Symbols Graphics, APL/APL2, and EHLLAPI.

Users can personalise the way they view and use mainframe applications via a full colour palette, font resizing, programmable softkeys, macro languages, and a customisable keyboard layout.

Windows features like Multiple Document Interface, DDE,

and multiple sessions are supported, and the software enables an unlimited number of simultaneous display and/or printer sessions, officials said.
JNA (02) 417 5837

Remote Access Server

Coombes Technology recently released a remote access server which provides mobile/remote users with direct links to corporate networks via the PSTN. Dubbed CentrumRemote, the device has been designed by US-based network systems developer Centrum Communications.

Offering up to 16 ports, this modular product is based on a RISC chip set and does not require a dedicated PC or extra hardware or software. According to company officials, the device grants remote users equal node status within the corporate network and includes security features such as password protection, automatic call-back and traffic insulation.

CentrumRemote provides up to 16 ports for remote access

Other features include SNMP support, data and protocol compression, a down-loadable flash ROM, support for standard software interfaces, on-demand routing between LANs, and support for E1 connections.

Protocols supported by the CentrumRemote include Novell NetWare V2.15 and 3.11, Banyan Vines V4.0, 4.11, 5.0, FTP Software PC/TCP V2.05, Wol-longong Pathway Access V2.0, 3Com TCP with DPA V1.2, NetManage Chameleon V3.0, Novell LAN Workplace, Intercon TCP/Connect II V1.09, Microsoft LAN Manager V2.1, and Sun Microsystems' PC/ NFS.

Available now, CentrumRemote is priced at $8,750 (including tax).
**Coombes Technology
(02) 418 8022**

The CEN 232 has been designed for satellite and undersea links

Echo Canceller

Philips' new echo canceller, the CEN 232, has been designed for use in satellite and undersea digital communications links, as well as in digital mobile systems such as GSM and PCN.

According to company officials, tail lengths of 32, 64 and 128 ms can be selected, and power consumption has been reduced to 0.3W per channel for a 64 ms tail or -125W for 372 channels of 64 ms tail each.

Based on VLSI technology, the echo canceller boasts a very short convergence time of under 50 ms and high echo return loss enhancement, company officials said.

Complying with CCITT C standard for cancellers, the CEN 32 contains 15 circuit boards — two reserved for additional redundant power supplies, one housing the communications, control and alarm board, and twelve for the 2Mbps echo canceller units.

A single shelf permits echo cancellation of up to 372 voice channels and an RS-232 serial port can be used for the remote management of up to eight shelves. Reliability of the CEN 32 has been ensured through the provision of a redundant power supply, auto-testing of the ECU boards and securing VLSI circuits in the N+1 mode. In addition, the communications, control and alarm board can be removed without service interruption. Managed via a hand-held terminal connected to the CCA, each channel of the echo can-

celler can be configured through menus displayed on the terminal, officials said.

Philips Communications Systems (02) 925 3333

Network Printing

Andrew Australia has released two printer adaptors which support IBM 5250 and 3270 host printing and print sharing facilities to various HP printers.
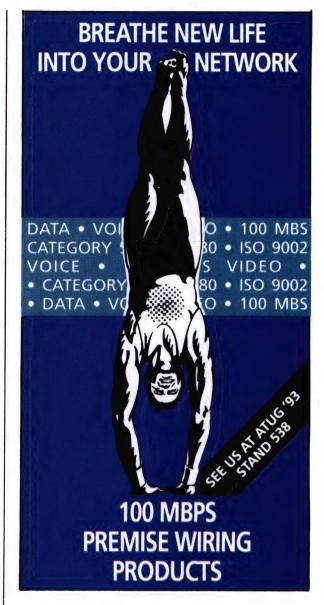
The Newport MIO/Twinax and Coax adaptors convert the HP LaserJet 4 and IIISi to a mainframe or midrange printer. Simultaneous connections can be supported via the centronics parallel port and RS-232 serial port as well as a twinax or coax connection.

Ports are switched dynamically and printouts sent to the printer in the order received. Company officials say the printer sharing feature allows host-based HP LaserJet 4 and IIIsi printers to maximise the use of the departmental printer for multiple printing applications.

Plugging directly into the Modular Input/Output interface on the LaserJet 4 and III Si, the adaptors can take advantage of the high speed bus and support the printers' full rated output speed.

The coax adaptor provides compatibility via 3287 printer emulation, while the twinax-model provides midrange compatibility through IBM 5224, 5225, 5219, 4214, 5256 and 3812 Model 1 emulations.

Andrew Australia (03) 357 9111

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STANDARDS AUSTRALIA

GSM and Australia's Digital Mobile Phone Future

There has been much discussion about Austel's recommendation to adopt the GSM digital standard for future mobile telecommunications in Australia.

So how and why did Austel come to its decision?

Austel first recommended the digital GSM standard for Australia in its May 1990 Public Mobile Telephone Services Report to the Minister for Transport and Communications. This was followed by a November 1990 statement on Transport and Telecommunications Reform, in which the Federal Government asked that Austel review its position on GSM. An investigation was initiated by Austel and public comment was sought, with the overwhelming majority of submitters supporting the introduction of GSM.

The focus of Austel's initial investigation into the most appropriate structure for future mobile communications in Australia centred around the provision of services rather than technologies. The licences for public mobile telephone services are technology neutral, that is, the licensees are not trapped in a particular technology. This has left the technology decisions primarily in the hands of the industry, and in the case of GSM technology Austel based its recommendations on extensive consultations with industry and its Standards Advisory Committee.

Before further discussion of the decision to run with GSM, however, it may be useful to revisit the reason for the changeover from an analogue-based system to digital technology. Why the change? Is it really necessary?

The Digital Necessity

The answer to these questions is an unequivocal yes. With Australia's mobile telephone market expanding at a phenomenal rate the existing AMPS system is fast running out of capacity. The current system can accommodate expected demand in the short-term but will not be adequate for future demands. With this in mind it has been necessary to make an early decision on a new standard — both to allow for future demands and to provide firm industry direction.

Digital technology provides for much greater capacity as well as offering Australia's mobile phone users a better quality service with enhanced features — including better voice quality, higher levels of security, short messaging and data transfer applications.

So why GSM? As mentioned earlier, Austel based its recommendation on extensive consultations with the telecommunications industry. Those who provided comment to Austel agreed that the technology adopted must have high level international recognition. The GSM standard is already widely used in Europe and other countries around the world, and is clearly a standard that has earned worldwide credibility.

Most importantly, however, was Austel's consideration of the Federal Government's charter for competition in Australian telecommunications. In its recommendation of GSM as the new Australian mobile digital standard, Austel's primary consideration was the maximisation of competition through the licensing of three rather than two mobile operators.

At the time of Austel's investigation GSM was the only digital standard that would allow more than two mobile operators to be licensed. This proved a key factor in Austel's deliberations. The North American D-AMPS digital standard, for example, requires customised equipment to accommodate multiple operators, whereas GSM is immediately able to support the licensing of up to five mobile operators. The GSM standard would allow all three licensed operators to start on a level playing field in a new frequency band.

Migrating From AMPS

Telecom will continue to operate the existing AMPS mobile network, which will be phased out between 1996 and the year 2000. An implementation strategy for this is being developed jointly between Austel and the Department of Transport and Communications. Austel's main concern in this will be the smooth migration of users from the existing service across to the new service with minimum customer inconvenience.

The movement of customers from analogue to digital services and the associated implications for customer equipment is a significant consumer issue. Consumer reaction to the closure of the 007 service — the early cellular mobile service — has emphasised the importance of ensuring that technological change is properly managed. Austel is considering the development of a consumer information campaign to properly inform consumers of the choices they will have in the near future for selecting a mobile service.

Telecom and Optus are licensed to commence operation of their GSM service from 1 April 1993. Arena GSM is licensed to begin operating from 1 July 1993.

The transition to digital services will be further facilitated by licence conditions placed upon Optus and Arena GSM. Optus must have offered, and be in a position to supply, service by means of digital facilities to not less than 80% of Australia's population by 31 December 1997. By no later than 31 December 1996 Arena must have offered, and be in a position to supply, services by means of digital facilities to areas in Australia in which not less than 80% of the population of Australia reside.
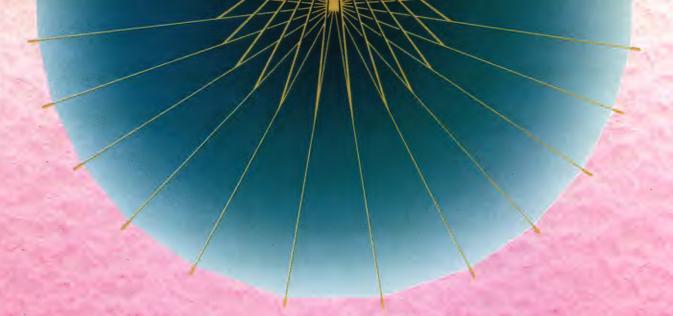
There will be a period of several years where the current system will continue to operate while the three new networks are being introduced across Australia.

Another emerging issue is mobile telephone number portability. There are two aspects to this issue. Firstly, the ability to keep your number when moving from the existing system to one of the three digital networks, and secondly, whether it is possible to retain the same number if moving between the three digital networks. There are technical limitations to both these scenarios, but Austel is examining what is achievable as part of its development of a new national telecommunication numbering plan.

Inter-system roaming — the ability of a customer on one mobile network to 'roam' onto the network of another operator — will be a commercial matter for the mobile licensees to resolve.

Australia's mobile telephone industry is now one of the most advanced in the world. Austel strongly believes that the introduction of GSM will help ensure that Australia remains at the forefront of technology in mobile communications, and that our telecommunications industry continues to deliver the full benefits of competition to consumers.

> *"In its recommendation of GSM as the new Australian mobile digital standard, Austel's primary consideration was the maximisation of competition through the licensing of three rather than two mobile operators."*

Thinking About Telecommunications Development

Several articles in the latest *Pacific Telecommunications Review*, the official magazine of the PTC, focus on telecommunications development. If one looks at the Pacific hemisphere today, compared to a decade ago, the development of telcos in the region has been staggering in terms of size and quality.

Within Australia and New Zealand, as in North America and Europe, there has been a fundamental cultural change in the role of telecommunications and society. We look at telecoms in a different way than we did in the monopoly or Post Office days. This cultural change, in which telecoms is viewed as a central and essential service competitively offered, continues to evolve. Businesses and individuals shop for telecom services and expect a level of quality and integration unheard of a few short years ago.

Before we congratulate ourselves too heartily, however, it is necessary to note that much of the world continues to lack even the most rudimentary and basic telecommunications services. From Mexico to Peru to Russia to Vietnam to Indonesia, the majority of the population of the Pacific hemisphere is a very long way from the information technology revolution. The need to rectify this situation was the impetus behind the Maitland Commission, which sought to bring attention to the massive transfers of money and technology that would be necessary to achieve its goal of universal access to basic telephone service (not 'phones for all,' but simply access to a 'village phone' or some equivalent).

Some readers will recall the Maitland Commission, established at the 1982 ITU Nairobi Plenipotentiary Conference, as the Independent International Commission for Worldwide Telecommunications Development. Usually named after its chairman, Sir Donald Maitland of the UK, the Commission was given the mandate to 'examine the totality of existing and future relationships between countries in the field of telecommunications . . .' and 'to recommend a range of methods including novel ones for stimulating telecommunications development in the developing world . . .'. While telecoms development had been an increasing concern within the ITU as early as 1959, the Maitland Commission was a landmark event in enhancing the recognition of the role of telecoms in overall economic and social development.

What has changed in the years since the Maitland Commission is a change to the culture of telecoms development that has made that development possible. At the time of the Maitland Commission, I believe there was a tacit assumption on the part of the ITU and the Commissioners that developing countries would seek to develop telecoms along the lines they had employed in attempting to develop agriculture, transport, hydroelectric facilities and other infrastructural development projects. That system implied inter-governmental arrangements for loans, experts, projects etc., and bilateral and multilateral development involving the appropriate Ministries.

Although in vogue until the time of Maitland, this system had not adequately addressed the needs of developing countries. Part of the problem was attributable to the low priority assigned telecoms by inter-governmental development bodies such as UNDP, World Bank, and others. But the heart of the problem remained the recalcitrance of many, if not most, developing countries to embrace the underlying philosophy of telecommunications — the individual citizen's right to communicate and the central role of the unhind-

ered telecommunications to economic and social development. If telecoms in a given country were poor, this was explained away with a variety of excuses: Agriculture and other priorities were more important; the people didn't want phones; a perfectly good postal system existed; or worst of all, that telecoms development was some sort of neo-colonial plot to foster dependence on cigar-smoking capitalists in top hats.

Since the early 1980s, there has been a fundamental cultural shift in the way telecommunications is seen. Telecoms is now acknowledged within developing country administrations as a central tenet of infrastructural development of agriculture, transport, urban services, and so on. It is now recognised that development requires an opening up to the world and that autarky is neither possible nor desirable. Toward this objective, it is seen that any opening up to the world is determined by access to global telecommunications and information technology.

This is not the only major shift in political and bureaucratic cultures. There has also been a complete change in how developing countries approach telecoms development. Telecommunications will not develop along the traditional foreign aid lines of the 1960s and 1970s. Indeed, the experiences of developed countries in the rush to corporatise and privatise telecoms, dating back to divestiture in the US and the wave of liberalisation in Japan, Europe and elsewhere, has added a new dimension to how developing countries view telecoms. Telecoms is now seen as far more than just basic telephony. But this philosophical shift within developing countries constitutes more than a reaction to outside events. Indeed, some developing countries have created more liberalised and competitive telecoms environments than some developed countries.

> "... the most successful developing country approach to telecoms development is not necessarily a reaffirmation of the invisible hand of free markets and the profit motive."

However, the most successful developing-country approach to telecoms development is not necessarily a reaffirmation of the invisible hand of free markets and the profit motive. After all, telecoms investments are of a huge scale and the returns are not immediate. As Ben Petrazzini notes, telecoms development often requires not only government structures, regulatory frameworks (and a commitment to the rule of law), and political will, but also a strong, clearly interested and motivated executive to push through the necessary political and economic steps. Without the emergence of domestic political and cultural will, external efforts will achieve little.

Next year's PTC Annual Conference, PTC'94, scheduled for Honolulu on 16-20 January 1994, will review progress since the Maitland Commission, and what else needs to be achieved. The report of the Maitland Commission was entitled 'The Missing Link.' PTC'94 will centre on 'Forging New Links' and focus on the social, economic, and technological changes that have taken place. We will cast a look ahead to the dramatic changes that have yet to emerge. These changes are not technological. The cultural and political dimension of the telecoms of the future will be increasingly important, as the global network draws us closer together, and we see PTC playing an increasingly important role as the Pacific hemisphere's forum for those interested in the telecoms domain.

James Savage is the Assistant Director, Pacific Telecommunications Council and Editor of Pacific Telecommunications Review.

From the desk of the Executive Director

Privatising Telecom — Is It a Big Issue?

As this editorial meets its deadline, the election is only a few days off. A very significant debating point during the lead-up to the poll has been the privatisation of AOTC, the price it might fetch, and whether, in addition to the Coalition, the Labor Government, if it retains power, will also take the privatisation path. There seems to have been a softening of Labor's attitude to privatisation of the carrier.

So, whatever the politics of the new government, privatisation is likely to be on the agenda. At IBC's recent Intelaw Conference, Dr Chris Beare, Managing Director of Hambros Telecommunications Ltd, gave an excellent overview of the AOTC privatisation issue. This editorial is based on that presentation.

For almost everyone except a government, which might have need of the capital realised, privatisation is certainly not the most important issue. The major decisions to introduce a duopoly, to allow full simple resale and to set a sunset on the duopoly, thus promoting the ingredients for vibrant competition, have all been made.

For users, that competition is what matters, and we are already seeing the benefit in terms of price and quality of service.

Some maintain privatisation will mean more lost jobs at Telecom, once it becomes answerable to its private sector owners. How can this be so? There should be absolutely no difference in Telecom's approach to greater efficiency, as it copes with the challenges of competition, no matter who is the owner — government or private.

Privatisation is much more about other ownership issues, the role of the Government in this kind of business, and in the best use of the dollars involved.

As telecommunications technology and its widening applications have evolved worldwide, governments are coming to realise that they may not be the best owners for telecommunications companies, for a variety of reasons.

For years we have seen Telecom struggling with governments of both political flavours for adequate loan funding. To my knowledge, the carrier has (at least since 1984) had to rely on utilising more internally generated funds than its original charter required, because loan funds were not available. (We may otherwise have had a network almost completely digitised by now, instead of lagging some way behind many OECD countries, at about 35% digital).

So there is a reluctance to provide capital, of which governments can make better use in other areas. In addition, governments tend to meddle. On one hand the Government tells Telecom to get more efficient, while on the other it tells it to go easy on redundancies!

Finally, there tends to exist in government businesses a culture that gives the comfort of a secure job for life, and that regards customers as a necessary nuisance. I would hasten to add that both these culture factors have changed markedly for the better recently, but there remains a residue of the culture that is not as responsive to customers as they would like.

A Sensible Option

So, privatisation, aside from the sudden inflow of funds it can provide, is also a sensible option, firstly because governments around the world tend not to understand the business as well as the professionals who run the telcos, and secondly, because others in the private sector may be able to add more value to them.

There is no reason to think that a government is necessarily abrogating its responsibilities to the public by selling off such an important asset. It can still achieve its political, national security and community service obligations through legislation, licence condition, regulation and 'golden' or 'Aussie' shares.

We already have examples of this in the pro-competitive safeguards with which Austel is charged, in the Universal Service Levy which guarantees service obligations to all, and in the price caps on many AOTC tariffs.

Very properly, Chris Beare did not venture an estimate of how much AOTC would be worth, nor really can anyone until we know the nature of the market and the regulations at the time of deciding to privatise. We need to see too, how well the new management is coping with competition and how effective that competition is.

But Dr Beare did give an interesting indication of the amount and sources of possible funding. He saw the sources as Australian institutions, the public, AOTC employees, international institutions and strategic investors.

In recent years, the Australian stock market has had raisings typically of $7 to $10 billion. Noting the investment profile of those operating on the ASX, he felt that, over time, Australian institutions will speak for $5 to $8 billion of an AOTC float.

In addition, because international stock markets are more familiar with the telecommunications service business and they think globally in investment terms, another $5 billion could come from that sector.

Finally, a consortium of two or more of the major national carriers or US Bell Operating Companies might speak for between $5 to $8 billion.

So it appears that the funds could be raised if the prize is attractive enough. Obviously, the size of the raising means tranches will be necessary. But Dr Beare makes the good point that the sale should wait until all the unknowns — about policy, AOTC management and competition by Optus, Arena, and various service providers — are removed, before the due diligence process should start.

That probably means privatisation at the end of 1994. As he says, "earlier is possible, but harder."

It is an issue which is likely to dominate the telecommunications environment in the immediate future. The sooner the timing is known, the better for all those involved, not to mention the user community.

Wally Rothwell

Wally Rothwell
Executive Director

ATUG'93 PREVIEW

ATUG'93 — Competition in Action

By Toula Mantis

Australia's telecommunications industry has graduated from its first twelve months of competition and with a preselection ballot scheduled for sometime after June this year, the 10th annual conference of the telecommunications industry, ATUG'93, promises to be an event that should not be missed.

Unlike other events in the telecommunications industry, the annual conference and exhibition organised by ATUG is the largest in the Southern Hemisphere, offering users the opportunity to meet the players in the industry from the Government and the carriers as well as other users over a period of four days.

This year, ATUG'93 will have a special role to play as the carriers, the Australian and Overseas Telecommunications Corporation (AOTC) and Optus Communications, gear up their million dollar marketing campaigns to woo Australia's eight million telephone users to vote for their long distance service on preselection day. The ballot was announced last year after Optus launched its long distance service in Sydney, Melbourne and Canberra. As a result, ATUG will be offering the opportunity to the carriers to present their case on the last day of ATUG'93 during the final plenary session called 'The Battle of the Carriers.' Other industry dignitaries will also be involved. This 'live' debate will be filmed for

a television audience. In addition, following the Federal Election, ATUG'93 will give an opportunity for delegates to hear the latest Communications and Transport Minister. The hot telecommunications issues for the Government include the ongoing saga of Pay TV transmission technologies and the privatisation of AOTC.

Last year the industry met the two chiefs of the competing carriers, AOTC's CEO, Frank Blount, and Optus' CEO, Bob Mansfield, in Melbourne during ATUG'92. This year, the two chiefs are back at ATUG'93 together with the latest entrant to Australia's telecommunications market, the third mobile licence holder, Arena GSM.

Taking the podium on the first morning of the conference will be Arena GSM's Director, Philip Cornish. The occasion offers the first opportunity for the company to announce its plans to the industry. Other firsts are found on the exhibition side of ATUG'93. This year the exhibition has been used by large telecommunications companies to demonstrate and display their modern technologies and services in their own right.

Competition Fever

Call it competition fever but the exhibition is fast becoming the forum for competition in action — the theme of ATUG'93, as exhibitors compete to have the largest and brightest stands to win the attention of visitors. To date, around 150 exhibitors have confirmed their presence at ATUG'93 including Fujitsu, Canon, Nokia, Panasonic, Hewlett-Packard, AOTC, Optus, Ericsson, Nortel, NEC, AT&T and AAP.

This year's annual event will take place at the Sydney Exhibition Centre, Darling Harbour from 11-13th May, 1993. Last year, the event was held in Melbourne and was well attended, according to Riddell Exhibition Promotions Pty Ltd's Exhibition Manager, Tony Pool.

He said the number of people recorded as having attended the event was 10,605, and "this year we expect 12,000."

A decade after its first conference and exhibition, ATUG has put together a program which not only gives an insight into the issues of the telecommunications industry today but also caters for distinct groups of telecommunications users: The small business user, the professional user, the corporate user and the executive user. Thus, this year's event opens the door to interested persons other than ATUG members.

It should be noted, however, that non-ATUG members are always welcome to attend the annual conference and are encouraged to become members.

Communications Update Seminar

As always, the program begins with the Communications Update Seminar on Monday 10th May, 1993. This one-day seminar focuses on the important issues for the telecommunications industry during the last twelve months. This is a good session for those who are new to the telecommunications industry. It is also a worthwhile session for those interested in the 'hot' issues of the industry, as it covers a broad range of topics including technology, the market, standards and the legal side of competition.

The opening address will be given by Jim Davidson, who chaired a committee of inquiry into telecommunications services in Australia set up by the Government in September 1981. The inquiry was asked to examine and report on, among other things, 'the extent to which the private sector could be more widely involved in the provision of existing or proposed telecommunications services in Australia either alone, in competition with or in conjunction with the Australian Telecommunications Commission.' As a result, Davidson has been invited to give a 10-year perspective based on the

ATUG'93 PREVIEW

findings and recommendations of the 1981 report dubbed 'The Davidson Report.'

As the regulatory environment has evolved from a monopoly to a competitive regime making Australia's telecommunications industry a very different market, so has the technology evolved converging information technologies with telecommunications to produce the mobile information age. This convergence of technologies is the keynote address of the communications update seminar. The keynote address titled 'Computercations — the World of Convergence' will be given by Apple Computer Australia's Managing Director, David Strong.
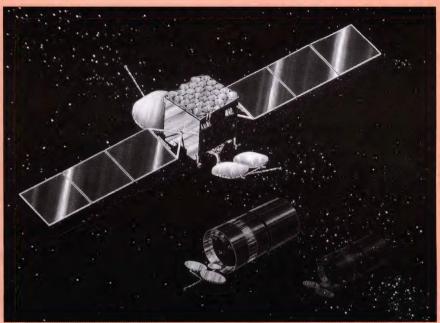
Other highlights of the Communications Update Seminar include presentations on the changing environment by the Chairman of the Ombudsman Council; a review of standards and regulations by Austel Member, Johanna Plante; and presentations with regard to competition in action by AOTC's Group Managing Director for Corporate and Government and International, Stephen Burdon, and Optus Communications' Chief Operating Officer, Ian Boatman.

Stewart Fist, a communications journalist, will be ending the Communications Update Seminar with the question 'Are we doing it right?' According to Fist, one has to ask whether real competition is possible under a duopoly regime. He will look at competition after 1997 and will consider some alternative ways to getting better prices and services for users.

Small Business Seminar

The Communications Update Seminar will run concurrently with the Small Business Seminar on Monday, May 10th, 1993. This seminar targets the small business user and is presented by the Small Enterprise Telecommunications Centre (SETEL) as part of ATUG'93. This is also a one-day seminar. Presentations will be made by SETEL, Austel, AOTC, Exicom, the Minister for Small Business, the Consumers' Telecommunications Network and the Queensland University of Technology Communications Centre.

The presentation by Johanna Plante will give an insight into how the deregulated telecommunications industry works and, of course, Austel's role in the competitive environment. The topic, 'Building on what is available now' is yet another presentation which will be of interest, however, details were not available at the time of printing.

Optus satellites and Pay TV — an ATUG'93 controversy

The final session is one that should be of benefit to both participants and speakers. A panel of speakers will be ready to listen to participants' queries regarding the deregulated market. The session is titled 'Where do we go from here? What do you want from us?' and gives users an excellent opportunity to tell the industry players what their telecommunications requirements are and the issues that concern them.

ATUG'93 Conference

The conference has once again remained with its successful formula of three days of presentations and workshops. It begins on Tuesday, May 11th, 1993 and ends on Thursday, May 13th, 1993. On each day the presentations are divided into three streams and the 'hands-on' workshops are held in parallel.

In general, the program lacks 'buzzwords' and technical jargon but it does look into the technologies of multimedia, frame relay, asynchronous transfer mode (ATM) and fibre distributed data interface (FDDI) and their emerging applications. Also featured are presentations on fibre optics, wireless communications, voice processing, security, the modern information technology and telecommunications manager, research and development, satellites and modern network management.

DAY 1
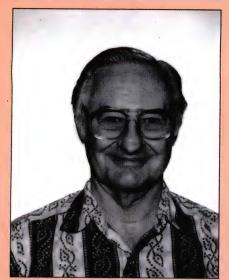
There are a number of presentations which should not be missed. The first is the Keynote Address on the first day of the conference by Jim McKerlie, Deloitte Ross Tohmatsu's partner for the division of Management Consulting Services. He will be discussing competition in telecommunications and the changes facing AOTC as the dominant carrier.

According to McKerlie, the nature of these changes are reasonably predictable based on observations of other countries where the dominant carrier has moved from a monopoly position through to restricted, then open and finally to a totally free market environment. They affect "culture, management style, organisation structure, strategic directions, human resources, marketing directives, operating methods and information systems," he said. Another major aspect of the changes is how telecommunications users are viewed. Dominant carriers start to realise that they have to understand customers much more. McKerlie will give examples from other markets and will also focus on Asia.

As mentioned earlier, the Federal Government has appointed Arena GSM as the third mobile licensee in Australia. Still in the embryonic stages, the expectations are great and the competition in the mobile

ATUG'93 PREVIEW

Les Free, digital communications consultant . . . 'multimedia offers Australia opportunities'

market will be fierce. Arena GSM has earmarked September as its point of entry into the Australian marketplace. Thus, it will be interesting to learn how it plans to win business following the competitive offers being made to users by AOTC and Optus.

'Whither the copper pair?' is the title of the last presentation in Stream Two of Day One of the conference. At the time of writing this article the only details available were that the presentation will be given by AT&T. However, with the current controversy over Pay TV and its transmission, the fact that such a service can be transmitted via the telephone line should indicate that this will be a fascinating presentation.

DAY 2

Day Two opens with Austel's Chairman, Robin Davey, AOTC's CEO, Frank Blount, and Optus' CEO, Bob Mansfield, discussing competition in action. The last twelve months have been rigorous for these three parties on a number of issues.

AOTC has been under the scrutiny of Austel on a number of occasions with inquiries such as its payphone investigation, its investigation into the network termination point, its rural and remote investigation and its investigation into AOTC's call charging and billing. Both Optus and AOTC are also gearing up for the preselection ballot which will be conducted from mid-1993 on a region by region basis. According to recent media reports, AOTC is expected to

spend $71.3 million on advertising Telecom products during this year whilst Optus is expected to spend $20 million on media advertising during the six month period prior to the ballot.

With so much at stake, the morning presentations are sure to be true to ATUG'93's theme 'Competition in Action,' — hence ATUG's use of the terms '. . . in the red corner' and '. . . in the blue corner.'

Another presentation of interest during Day Two of the conference is that of Dr John Beale, manager of the University of NSW Computing Services Department. The university is employing FDDI technology to implement a private network and has invested around $1.7 million to date on this project. According to Dr Beale, the project is 'leading edge' and has received interest from a number of overseas universities. Attendees should also note AOTC's National Manager for Networks, Kevin Phillips' presentation discussing AOTC's new digital mobile services as part of the stream's general theme 'GSM heats up.'

Stream Three has a presentation on the much used but least talked about subject in telecommunications — the telephone directory. The presentation has been titled 'Cinderella of PABX Management.' This presentation will be given by Corporate Telephone Directories Pty Ltd's Managing Director, Myles Hampton-Chubb. The company designs directories to provide large network users with easy reference to telecommunications information that will permit quick and efficient communications using the most appropriate electronic facilities available. Thus, the presentation will include current managerial, technical and user problems as well as discussing practical steps to develop and implement 'mission critical' corporate directory systems.

Workshops

The Workshops have played an important role during the past ATUG conferences, and this year is no exception. The Workshops to look out for during Day Two of ATUG'93 are Workshops Five, Six, Seven and Eight. Workshop Five looks at the future of the modem and will be presented by Netcomm Australia's Managing Director, Chris Howells, who is a well-known figure in the computer industry. The developments of the modem are leading the convergence of computers and telecommunications.

Workshop Six, 'Communications Management: Best Practice' will be presented by Brian White, a consultant with Amos Aked Swift. This is a workshop which often attracts a large audience says ATUG's Executive Director, Wally Rothwell.

Workshop Seven carries the convergence theme and is titled 'Computers and Convergence.' Giving the presentation is Sun Microsystems Australia's networking and communications specialist, Brian See. He will discuss how computers are being used in telecommunications. "Currently, the growing trend is towards open systems and so computers are being designed to suit the different environments in existence today. In Australia, telecommunications companies such as AOTC, Alcatel and Ericsson are following this trend. They are operating under a Unix environment based on HP and Sun Microsystems computers to offer telecommunications services," See said.

Workshop Eight focuses on China and is presented by ATUG Director, Gerald Wakefield. It is titled 'Doing information technology business in the Peoples Republic of China.' This presentation is part of an ongoing ATUG seminar series in conjunction with Sly & Weigall discussing the legal and regulatory requirements in the Asian countries of Indonesia, Singapore, China, Thailand, Malaysia and Vietnam.

DAY 3

The final day of ATUG'93 covers five controversial subjects: The human dimension of telecommunications; research and development in Australia; communications security; modern network management; and finally satellites.

The Human Dimension

Ann Cooper-Southam has a story to tell which exemplifies the human dimension of dealing with a dominant carrier. This presentation is not to be missed. She became a telecommunications consultant by default following her appointment by AOTC CEO, Frank Blount, to handle customer complaints after a 008 number complaint of her own was settled. "We had advertised a 008 number for our business but unfortunately, customers calling the number received a 'disconnected' announcement. As a result, we filed for compensation for the loss of business," she said. Frank Blount contacted Cooper-Southam and settled the claim and

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asked her to speak to 16 of AOTC's top executives, after which she was given the job of Telecom Intermediary for Australia. However, the position was short-lived when she left Telecom because access to areas which had been freely available to her were curtailed and she could no longer do her job effectively.

Security

There have been a number of stories in the press regarding incidents of toll fraud overseas and incidents of hacking in Australia. Thus, on the issue of security, are presentations titled 'OSI and data security' and 'How secure is your PC?'

Research and Development

Research and development in Australia has at times been a controversial issue especially with the recent Government push for Australia to be the 'clever country.' The advances in speech recognition is the subject of Professor Robin W. King, who is currently involved in research in this area with the Department of Electrical Engineering with the University of Sydney. His presentation will review the developments in speech science and technology which underpin current state-of-the-art systems.

Ann Cooper-Southam discusses the human dimension of telecommunications

The presentation will also outline the contributions being made in Australian laboratories to the research and development of advanced systems.

"Advanced speech coding techniques which exploit knowledge of the human articulatory and auditory processes now offer the means for digital transmission at rates approaching 2Kbps. The value of this for the development of mobile and satellite networks is enormous, and Australian researchers are at the forefront of these developments," he said.

Multimedia

The topic of multimedia is discussed during Day One of the conference by digital communications specialists such as Les Free, a recent adjunct professor with the Queensland University of Technology. The topic is discussed again on Day Three of the conference by Ray Liggett, Director of Research with Telecom Research Laboratories. According to Les Free, the technologies involved with multimedia and its application will offer Australia a number of opportunities. Thus, the development of a multimedia system by Telecom Research Laboratories should be of great interest.

Pay TV & Satellites

The Optus B1 and B2 satellites have not been without controversy during the last twelve months. Optus' Director for Business Development, Dr Wayne Nowland, will discuss the use of Optus satellites for the transmission of Pay TV as part of Stream Three on this day. Obviously, with the B2 satellite lost in space, Dr Nowland will concentrate his discussion on the B1 and B3 satellites. He will also discuss how the satellites may be integrated into the larger Optus network. In addition, he will discuss future broadband digital services and the research and development program undertaken by Optus in the areas of wireless communications and visual communications.

Preselection Debate

Finally, of course, will be the great debate called 'The Battle of the Carriers' which was mentioned earlier. This is the highlight of ATUG'93 according to ATUG's Executive Director, Wally Rothwell. The debate will concentrate on the preselection ballot.

Exhibitions

The ATUG exhibition is always a catalyst for new product releases by exhibitor companies. According to Tony Pool, ATUG'93 Exhibition Manager, ATUG, now in its 10th year, is stimulating a great deal of activity in the marketplace and sees several new exhibitors throw their hats into the ring with major product launches.

"ATUG has grown steadily in both exhibition space and audience attendance since the first exhibition held in a city hotel lobby in 1983. It has grown significantly over the past six years, at a rate of between 20 and 30% each year," he said.

Product Launches

New products will be launched by Canon, Proteon, Cisco Systems and Krone. Major launches are also expected by NEC, Acesat Satellite Corporation, Oz Telelink and GEC Plessey Telecommunications (GPT). Canon will release the Canon FAX-B200, the world's first Bubble Jet fax, which incorporates the same technology as Canon's BJ 10 'Little Squirt' printer, and a new entry-level laser facsimile machine, the Canon FAZ-L700.

Proteon will launch two new products: The CNX 600 high end bridge-router and a new hub-router product for small departmental Token Ring and Ethernet local area networks at remote sites called the ProNET Branch Office Solution and dubbed 'Boss.' Krone will launch its new range of data and voice cabling products called the K100 series.
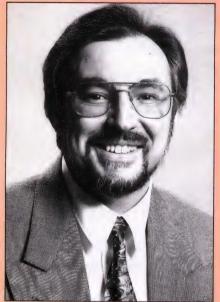
Exhibitor Presentations

The new product launches will this year be complemented with several organised exhibitor presentations. These exhibitor presentations are another ATUG'93 feature which will take place during the period of the conference, and will offer the opportunity for conference attendees to see how the technology works.

Wireless Networks

On Day One of the conference, personal computer-controlled telephones will be demonstrated by GPT. This will be followed by a conference presentation on the advances in cordless office communica-

ATUG'93 PREVIEW

Dr Wayne Nowland . . . the satellite scene with Optus Communications

tions by GPT's Business Systems Group Product Manager, David Wright. He is one of several international guest speakers that will be present during ATUG'93. According to Wright, cordless systems are set to revolutionise the way business communications are done in the 1990s. "As with the digital switching revolution in the 1980s, the changes are likely to be wide ranging. The presentation will cover the evolution of cordless communications and in particular its application within various business sectors, together with the economic benefits that will be achieved," he said. Keep a lookout for other GPT exhibitor presentations during ATUG'93.

Data Networking

Another international guest speaker during ATUG'93 will be Mark Hoover, SynOptics Communications' Manager for Internetworking Products. He was an active member of the ANSI X3T9.5 Committee on FDDI as well as an early contributor to the IETF OSPF specifications. The topics to be covered during his presentation include the issues facing network managers today as they strive to implement an integrated network management system. He will also discuss the importance of industry standards, including network management protocols. His presentation is titled 'LAN internet-

working and management' and will be presented in the afternoon of Day Two.

However, on the first day of the conference, Hoover will be demonstrating how to implement a low cost ATM LAN solution. This demonstration will be repeated on Day Two and Day Three of the conference. In addition, SynOptics will also be giving a presentation on network management titled 'Network management — the great unifier' during the last two days of the conference.

Videoconferencing

A number of exhibitors are taking the opportunity of ATUG'93 to demonstrate the advances in videoconferencing. One example is Allnet Technologies which will be demonstrating the Megavision real time desktop videoconferencing system via twisted pair cable plus Megavision's latest Multi-functional desktop videoconferencing. The future of videoconferencing is a subject of great interest to telecommunications users. Those who are fascinated by this technology should keep in mind GPT's presentation on Day Three of ATUG'93. The topic to be presented as part of its exhibition presentations is the future developments of videoconferencing.

ATUG'93 Entertainment

One of the popular attractions of ATUG events is the fact that users can get together. This event is no different.

However, in addition to the Fujitsu-sponsored lunch, post seminar drinks, conference cocktail party and the Optus-sponsored conference dinner, the program organisers have added some light entertainment to ATUG'93 which is sure to be a hit with telecommunications enthusiasts.

On Tuesday, May 11th, 1993, following the AOTC-sponsored conference cocktail party, ATUG will be screening the comedy *Sneakers* starring Robert Redford and Dan Ackroyd. The plot is based around the communications technologies that are in existence today. It is sure to create an interest for the presentation scheduled on Thursday, May 13th, 1993 on the topic of privacy and security in communications.

ATUG Awards

Last year, ATUG introduced a number of awards for contribution to Australian tele-

communications. This year, the awards will be presented again.

The Charles Todd Medal for Communicator of the Year will be presented to the person considered to have made the most contribution to telecommunications during the last twelve months. This award was presented to Professor John L. Hullett during ATUG'92. The second award to be presented was won last year by the editor of *The Australian* newspaper's Business Communications, Helen Meredith. The award recognises the Communications Journalist of the Year.

These awards are also complemented with a number of prizes from competitions which are held during the event. Conference attendees and exhibition visitors should look out for these.

Special Executive Seminar

Senior business executives are one group of telecommunications users which ATUG has developed a special program for on Tuesday, May 11th, 1993. The exclusive program called 'The Executive Seminar' is designed to run for half a day and provides an opportunity for the exchange of information on technical advancements in communications, new developments in telecommunications regulations and policy, and of course, their effects on business. For those who may be interested in this session it should be noted that only senior executives are invited to attend.

The Competitive Edge

Overall, ATUG'93 with its theme of 'Competition in Action' will set the stage for a most informative occasion where telecommunications users will be able to discover what the new competitive environment will offer them and how they may best use the new services to gain a competitive edge. To summarise, ATUG'93 will offer users the opportunity to discover:

- What technology will be in use during the 1990s;
- How to correctly implement it to boost business productivity;
- The latest telecommunications services for modern business;
- The full benefits of competitive telecommunications; and, finally
- Who the telecommunications suppliers are.

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The kit clearly explains terms, technology and practices used in EDI. It consists of an overview booklet; two videos; a handbook which explains terms, standards, systems and business issues; and an interactive presentation on computer disk.

If you wish to purchase the *EDI... A Better Way* kit, or if you would like more information, please contact Standards Australia Marketing Services on (02) 746 4700, or fax us on (02) 746 8450.

Don't get left behind

STANDARDS AUSTRALIA

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April

5-7 **Network Cabling Design**, Sheraton Hotel, Melbourne. This intensive hands-on course covers a wide range of topics such as cabling standards and regulations, cable construction and transmission methods, diagnostic equipment, regulations pertaining to building wiring, cabling cost estimate techniques and future trends in cabling. Fee: $1,445. Enquiries — IIT Training Tel: (02) 959 5990 Fax: (02) 956 6375.

14 **Strategic Alliances in the Technology Industries**, Hotel Nikko, Potts Point Sydney. This seminar provides a systematic 'how-to' approach to developing strategic alliances and joint ventures in the technology industries. Key topics covered include selecting strategic partners, opportunities in the South East Asian region, cultural and management structures and legal considerations. This course will also be held in Melbourne, April 21. Fee: $595. Enquiries — IBC Conferences Tel: (02) 319 3755 Fax: (02) 699 3901.

15-16 **Designing and Implementing FDDI LANs**, MM Data Networks, Sydney. This course will teach the concepts, hardware, design rules and applications of FDDI. Participants will learn to plan and design FDDI installations, configure and install FDDI cabling and equipment, and diagnose and solve problems on an FDDI network. Enquiries — MM Data Networks Tel: (02) 980 6922 Fax: (02) 980 6795.

19-21 **Cabling '93**, Regent Hotel, Sydney. Looks at the role of ISO 9000 in cabling, GOSIP standards, contracting requirements, the latest standards and regulations, and new innovations. Guest speakers include: Linda Gardner, AT&T, Belgium; and Mil Ovan, Motorola, USA. There will also be half-day workshops on Optical Fibres and Cabling System Design, and Case Study reports on Fibre Optics, Contracting, Campus Cabling, and installing an FDDI backbone. The conference will also be held in Melbourne at the Regent Hotel on 21-23 April. Fee: All three days $1,795; two-day conference and one workshop $1,595; two-day conference only $1,295. Enquiries — IIR Technology Tel: (02) 954 5844 Fax: (02) 959 4684.

19-22 **SuperComm '93**, Georgia World Congress Centre, Atlanta, Georgia, US. Presented by the United States Telephone Association (USTA) and the Telecommunications Industry Association (TIA), SuperComm '93 is the largest annual telecommunications event in the world. The US & Foreign Commercial Service at the American Consulate General in Melbourne plan to lead an Australian Foreign Buyer delegation to SuperComm '93. Enquiries — Lois Logan, American Consulate General, Melbourne. Tel: (03) 526 5927 Fax: (03) 510 4660.

19-21 **SNA Essentials**, Gazebo Hotel, Sydney. Presented by internationally renowned SNA expert Tom Routt, this three-day seminar is designed to provide a comprehensive grounding in the concepts, architecture, implementation, connectivity approaches, products and issues associated with SNA networks. Participants will learn about SNA architectural concepts, components, layered services and implementation. Other topics include OSI connectivity, X.25 connectivity, TCP/IP connectivity and OSI-TCP/IP transitions. This seminar will also be held at the Melbourne Hilton, April 26-28. Fee: $1,443. Enquiries — MTE Tel: (02) 261 5555 Fax: (02) 261 5959.

22-23 **Telecommunications Equipment Testing**, Eden on the Park, Melbourne. Sub-titled 'Managing the globalisation of telecommunications equipment testing requirements,' this conference is designed to help equipment sellers get the best service from Austel-accredited test houses around the world. Leading Australian speakers will be joined by five leading international guest speakers, including: Don Heirman, Manager, Global Product Compliance Laboratory, AT&T Bell Laboratories; and Harry Dulmage, President, Certelecom Laboratories, Canada. Fee: $1,295. Enquiries — IIR Conferences Tel: (02) 954 5844 Fax: (02) 959 4684.

22-23 **Client-Server SNA**, Gazebo Hotel, Sydney. Provides a comprehensive analysis of SNA from a distributed, client-server perspective. Attendees will look at distributed SNA architectures, analyse LU6.2 as a general purpose interprogram protocol, and examine Node Type 2.1 and APPN as the SNA basis for peer-to-peer connectivity. Presented by Tom Routt, this course is also being held in Melbourne, April 29-30. Fee: $994. Enquiries — MTE Tel: (02) 261 5555 Fax: (02) 261 5959.

27-29 **Networking '93**, Sheraton Wentworth, Sydney. Covering LANs, MANs and WANs, this event will provide in-depth coverage of issues such as Fastpac, ISDN and Frame Relay, new networking options, integrated voice and data networks, intelligent switching hubs, FDDI applications, and developing, migrating and managing a network. An optional one-day workshop covering network implementation strategies will be held on Day Three. Fee: $1,795 for conference and workshop, $1,295 for conference only. Enquiries — AIC Conferences Tel: (02) 235 1700 Fax: (02) 223 8216.

28-29 **ATM 1993**, Hotel Inter-Continental, Paris, France. The rapid rise of Asynchronous Transfer Mode has left the industry grappling with questions about the shape of tomorrow's networks. This two-day conference will examine the driving forces behind ATM and the strategies surrounding its acceptance. Other topics to be covered include: The cost and benefits of implementing ATM; the realities of ATM in the LAN; ATM flexibility, and the impact of regulation on ATM services. Enquiries — International Conferences Tel: +33 1 47 23 34 22 Fax: +33 1 49 52 07 56.

28-30 **Hands-on Ethernet**, IIR Technology Centre, Sydney. Participants will build a live Ethernet network and learn key techniques for installing, operating and troubleshooting Ethernet networks. On completion of the course participants will know how to optimise Ethernet performance and deal with cabling, security and diagnostic tools. Fee: $1,495. Enquiries — IIR Technology Tel: (02) 959 5455 Fax: (02) 959 4687.

29-30 **Rural and Remote Telecommunications**, Sheraton Brisbane. This conference will examine Federal and State government policies and initiatives in remote telecommunications. Speakers will discuss the needs of users in rural and remote areas, the impact of national deregulation, and the way governments handle requests for more sophisticated telecommunications technology in rural areas. Fee: $1,195. Enquiries — IIR Conferences Tel: (02) 954 5844 Fax: (02) 959 4684.

May

10-13 **The 4th Joint European Networking Conference (JENC)**, Trondheim, Norway. Organised by RARE (Reseaux Associés pour la Recherche Européenne) in association with other groups including the Internet Architecture Board and the Internet Society, this year's Joint European Networking Conference has the theme 'European Networking in a Global Context.' Enquiries — RARE Tel: +31 20 639 1131 Fax: +31 20 639 3289.

10-13 **ATUG '93**, Sydney Convention and Exhibition Centre, Sydney. The 10th annual conference and exhibition of the Australian Telecommunications Users Group. Fee: $850 (Member), $1,075 (Non-Member). Enquiries — ATUG Tel: (02) 957 1333 Fax: (02) 925 0880.

17-22 **Asia Telecom '93**, World Trade Centre, Singapore. Asia Telecom '93 will provide a platform for the exchange of information on technological advancements, and technical, policy, economic and regulatory developments. The Asian region is the world's fastest-growing telecommunications market — there's space for 300 million more lines and for up to $US1,000 billion in investments in the next 50 years. The four Symposia of the Asia Telecom '93 Forum — Policy, Technical, Regulatory and Economic — are attracting the most influential players in the telecommunications industry. Enquiries — Suzan Hee-Sook Lee, Project Manager, Asia Telecom '93. Tel: +41 22 915 5811 Fax: +41 22 740 1013.

June

14-15 **High Speed Networks**, Melbourne (venue to be advised). This two-day seminar will discuss how and why to plan for technologies such as Frame Relay, ATM, B-ISDN and DQDB, which are expected to define the future of networking. Topics include why to invest In technologies, migrating to high-speed WANs, and when and how you will need to act. Fee: $1,195. Enquiries — IIR Conferences Tel: (02) 959 5455 Fax: (02) 959 4687.

September

20-22 **Understanding Data Communications Networks**, Maritime Conference Centre, Sydney. This two-day course aims to give professionals involved in data communications a thorough grounding in protocols and standards, modem terminology and technology, hardware and software interfaces, multiplexers, and transmission media and their uses. Fee: $1,445. Enquiries — ITT Training Tel: (02) 959 5990 Fax: (02) 956 6375.

October

26-28 **The Inmarsat International Conference and Exhibition on Mobile Satellite Communications** CNIT, Paris. The first Inmarsat conference and exhibition in 1989 focused on the development of mobile communications. This year the conference will address the future of mobile satellite communications, with senior-level speakers offering views on issues covering all areas of the industry. The exhibition will show the latest equipment and applications regarding mobile satellite communications. Enquiries — Tania Starley, IBC Technical Services. Tel: +44 71 637 4383 Fax: +44 71 631 3214.

November

28-1/12 **ACOFT-18 '93**, Northbeach Parkroyal Hotel, Wollongong. The 18th Australian Conference on Optical Fibre Technology will cover the latest research, developments, production applications and business strategies of optical fibres, waveguides, sources, detectors and other services for the telecommunications and sensors industries. A trade exhibition will be held in conjunction with the conference. Enquiries — Conference Secretary Tel: (02) 327 4822 Fax: (02) 362 3229.

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